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COLLECTANEA JACOBI

IN EIGHT VOLUMES

VOLS. I, II AND III, PEDIATRICS

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VOLS. VI AND VII, IMPORTANT ADDRESSES, BIOGRAPHICAL, AND HISTORICAL PAPERS, ETC.

VOL. VIII, MISCELLANEOUS ARTICLES, AUTHORS' AND COMPLETE TOPICAL INDEX

DR. JACOBI'S WORKS

COLLECTED ESSAYS, ADDRESSES, SCIENTIFIC PAPERS AND MIS- CELLANEOUS WRITINGS

OF

A. JACOBI

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IN EIGHT VOLUMES

EDITED BY WILLIAM J. ROBINSON, M. D.

NEW YORK

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A. J. J. J.

CONTRIBUTIONS

TO

THERAPEUTICS

BY

A. JACOBI, M.D., LL.D.

VOL. IV

EDITED BY WILLIAM J. ROBINSON, M.D.



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PHASES IN THE DEVELOPMENT OF THERAPY

PREHISTORIC times cannot have been without therapy. Wounds and diseases found sympathy and such aid as bystanders could give. Animals lick each other's bruises and the human animal cannot have been an exception to the rule. Later the power and practice of healing must have been considered a high privilege, for two or three thousand years B. C., the high priests and kings of Egypt practiced it. Their technique in many things was excellent. We know their rules for enemata, emetics, purgatives, bathing and frictions, circumcision, and embalming, and the number of specialties was at least as great as it is to-day.

The communication between countries and parts of countries was defective. That is why the healing art remained gross individual empiricism more in some countries than in others. Herodotus tells us that in his own time the sick person in Babylon was carried to the market place—for they had no physicians, he says—to be benefited by the advice of the wayfarers. For it happened at that time, as in 1905 after Christ, that your neighbors boasted of having enjoyed exactly the same disease and ache and knew all about its cure.

About the middle of the fifth century B. C., Hellas, whose first tales of legendary medicine dated back into the Homeric period when the "healing man was of more value than a host of others," had well-organized medical schools though not always unanimous in their teachings; a good beginning of public and private hygiene, and an extensive knowledge of many pathological and therapeutic facts.

Medicine and its main object, therapy, did not remain individual. Long before the Christian era—about 437—

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the Buddha king of Ceylon, Pandukhábayo, established sanitary institutions, amongst which there was at least one hospital, and one of his successors—Dathagámini, who died 137 B. C.—is said to have supported with ample means hospitals in eighteen different cities and to have had medicines prepared in them by medical practitioners.

Buddha's humane teaching extended westward to Persia and Asia Minor—not to Judea, however, where we know of isolation houses only for the leprous—where the king Usia had to terminate his life—and to Greece and Rome. The iatria of the asklepiads and the institutions established by Antoninus Pius were dispensaries and a few clinical hospitals. A few centuries after Christ the Christians found their gratification in helping one another in dangers and diseases, and nursing the sick in their homes and in hospitals. It is evident that the humane element prevailed in most of the cultured parts of the human family.

With us only that is different. Only three weeks ago town supervisors refused to the New York City Health Department permission to locate a tuberculosis sanitarium in an out-of-the way mountain region. But it is true they are the Shawamnunk mountains and the town board is that of Mamakating, and the Indian names still correspond with the tomahawk spirit of the uncouth savage, not amenable to instruction or humanity.

Though the Roman Emperors favored the physicians, medicine deteriorated under secular and clerical oppression. The belief in miracles, spirits and demons, and ascetic mysticism took the place of the naïve unscientific medicine of older times. Thus medicine perished though sciences in general were still nursed and though the study of the law flourished. Physicians were replaced by magicians and sorcerers; those few who clung to Hippocrates and Galen were suspected of heathenism. The Christian clergy established its own schools, the most famous of which was that of Edessa, in which the psalms of David and the Tabernacle were the preparations for medicine. When finally the Christians obtained the political power there came the end of philosophers and physicians. Only after the sixth century did the Benedictine monks begin again the

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study of Galen. The school of Salerno five hundred years afterward contributed its "regimen sanitatis"; which contains dietetics, with a brief pathological, pharmaceutical, and therapeutical appendix.

Meanwhile the Arabs studied botany and pharmacology, and used many remedies, metals, narcotics, stimulants, cosmetics, and aphrodisaics. Surgery and obstetrics, however, were thoroughly neglected. Before they had time to influence European practice at all medicine had a low standing. Jews and the lowest ranks of monks only were permitted to practice. When an illness appeared dangerous, the doctor had to provide a guarantee. When a nobleman died of a venesection, the doctor was delivered into the hands of the family. That was not only usage, it was law according to the West Gothic code. When a slave died in Venice, about 1100, the doctor had to pay; if he were a Hebrew he was hung. Thus it happened that only loud-mouthed charlatans were respected, and low monks, old women, shepherds and mountebanks would render their alleged services in the market places and at their kirmesses.

The first legislative recognition was bestowed on medicine in 1140, by King Roger of Sicily, who restricted the practice of medicine to those who were licensed. The German Emperor Friedrich II (1224) required three years' study of logic and five years of medicine and surgery according to Hippocrates and Galen, also a magisterial degree and a state license. A rate for services was established and the physician forbidden to keep an apothecary's shop. King Sigismund appointed a city physician in 1426. The master physician was to have 100 florins annually, the poor had the medicines gratis, the others paid the apothecary. The king adds in the court—if not courteous—language of his appointment—"For the big masters in physics serve nobody for nothing, that is why they go to hell." The supervision of medicine was no longer with the clergy.

The numerous universities of the eleventh and twelfth centuries made room for medicine after a while, but Arnold of Villanova says there was nothing in the teaching but

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grandiloquent theory. In spite of all their learning they "did not know how to apply an enema or to cure an ephemeral fever." The pedantic expounding of adulterated editions of Hippocrates, Galen, and the Arabs was still more perverted by scholastic methods. One of their best teachers, Arnold of Villanova, about 1400, on account of his doubting the propriety of combining dialectics with medicine was charged with heresy by the inquisition. He attributed to the drugs an actual property and a "complexio potentialis," which could only be appreciated by reasoning, but by no empirical method. Still, it was proclaimed to be after all the most important.

You notice that the history of medicine repeats itself. Four hundred years after him Hahnemann, who was quite learned, picked up from Arnold the idea of "potential" drug action. According to Hahnemann also no medicine was active as long as chemically or microscopically the slightest trace of the original substance could be detected.

John Gaddsdén in the same fifteenth century wrote a "*Rosa Anglica*." He eulogizes his own secret remedies, uses liquor as a panacea, hog dung for hemorrhages and cures the vermin of the eyebrows with purgatives. Possibly it is here that Hahnemann picked up his Psora. Perhaps it is not amiss to remind you that only two centuries ago Paullini wrote his "*Dreckapotheke*"—dirt pharmacy—which recommends urine, feces of animals and men, and other sweetnesses as all-healers. The best there is in this transgression of Paullini's—who otherwise was quite a meritorious man—is that he lived exactly at the same time when books were written on the cure of diseases by whipping, another by music, another by the breath of young girls. That is, as you are aware, what the elders recommended for the benefit of King David when he was old and decrepit.

Drug therapeutics were visibly aided in the fourteenth century by the establishment of apothecaries' shops, such as those of Esslingen 1300, London and Ulm 1364, Nuremberg 1338, Leipzig 1409. Regulations for their conduct were made in Paris 1484, Stuttgart 1486, Berlin 1488, Halle 1493.

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The compendium aromatariorum 1468, is a very copious collection of drugs by Saladin of Asculo.

For centuries, however, the main effort was spent on the search for a universal medicine which prevented and healed every disease, guarded against death, and changed metals into gold. Practitioners would spread the belief in their possessing the gold-making power. Even Robert Boyle, the man who first drew attention to the elasticity of the air, studied it in its transition and change into organic bodies and suggested the agency of imponderables in nature and in the causation of infectious diseases, the very man who died as late as 1691 as President of the Royal Society of Sciences, believed in gold-making. He abstained from making it, however, fearing that by so doing he would disturb the equilibrium of the world. No less a man than Isaac Newton praised him for this unselfishness. Gold was a most precious remedy, it needs must heal the gravest diseases, mainly in the rich. Culpepper wrote in 1675: "I fear to view the compound of gold, musk, and lapis lazuli, and horn of unicorn; it is a great remedy and invigorating, but it weakens the purse." Gold was kin to the sun, it healed everything "unless recovery was contrary to the will of God." The sun tincture which was said to contain liquid gold, was soon without it, however. Even the books taught that all the gold was found in the refuse. But three drops would save life. Even William Burton speaks of it about the time that Boyle flourished. It was part of the "Quintessence," the compound of plant, animal and mineral. Our own Massachusetts and Connecticut Governor Winthrop was after the stone of the philosophers and the all-healer, gold. Nowadays they say gold is made by those who are not afraid of disturbing the equilibrium of the universe.

On the other hand, the most nauseating materials were used as medicines, but chemistry also was studied and many useful preparations were discovered. Bisam, ambra, and precious stones, and compounds of numerous herbs and other objects were utilized. The great theriac was a compound of seventy articles. Syrups, pills, ointments, oils, and plasters were in common use.

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Of the nature of diseases they learned at those times but very little. Even long afterwards variola and morhilli are treated as synonyms. All sorts of plagues are mentioned; the sacred fire (erysipelas?) without discrimination. That is why the theory of the modern, mainly American, origin of syphilis could be asserted up to our present time. For skin diseases were general, and were not diagnosticated. But the nursing of the sick became a religious duty and a political office. Isolation houses were established and lepra disappeared in a few centuries from central Europe; the Norwegians have accomplished the same result in a more humane way during the last thirty years. That should be a lesson to us who are prevented by a narrow egotism and shortsightedness and the waste of the earnings of the people on wars of conquest and extermination from putting an end to the great white plague of the world. Hospitals were founded and nursing went far enough to become an absurd fad. Elizabeth of Thuringia cleansed the leprous, washed their feet, and kissed their boils and ulcerations. That is why she died very young and was sainted.

Meanwhile Therapeutics was not at all simple. The non-clerical physicians had to submit, or were fain to submit, to fast-days, processions, prayers, donations to churches and monasteries, incantations, sympathetic remedies—all for the purpose either of exorcising or of calling the aid of the evil spirits.

A very important progress was toward the end of the thirteenth century, the foundation of the surgical college of Paris. It was made independent of the clergy and of the medical faculty. With the latter it was in constant conflict; the best minds were engaged in it, and for all times the surgical part of medicine has determined the latter's fate in France. Guy de Chauliac wrote on wounds, hemorrhages, fractures, ulcers, and operations.

Of a similar, perhaps greater influence, was the appearance of formidable epidemics—the black death, the English sweat, angina, typhus, syphilis, which then was more formidable than ever before, and scurvy. They could

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not be managed according to the books and compelled the doctors to think for themselves.

The Hippocratic teachings founded upon the observation of nature and a healthy empiricism got lost during the Middle Ages. Aristotle misrepresented in garbled copies, and Plato, who looked for the explanation of material facts in mere reasoning, controlled what should have been medical thinking. The medicine of the Arabs was hated by most of the Christians because it was infidel.

Gross superstition was rife, however. Miracles were performed as in antiquity. Suetonius tells us that Vespasian cured the blind by his saliva and the lame by his touch in the temple of Serapis at Memphis. According to Nepotianus the right toe of Pyrrhus of Epirus cured diseases and deformities, "*remedio erat si cupus renes tumentes eo tetigisset.*" That is why when the body was incinerated the beneficent toe remained intact and could be preserved in a gold box in the temple of Dodona. The practice was continued in the Christian middle age. Scrofula was cured by the touch of Edward the Confessor and Philippe of France, and Olaf of Norway in the eleventh century. So it was called the king's evil. They lived at the wrong time, however, they required physical touch—to-day distant treatment is preferred. Both are of equal efficacy.

The inheritance of a glorious past was forgotten. The cloaca maxima of Rome erected two thousand years previously was disused and survived in ruins, and the 800 baths constructed in Rome within 600 years between 400 B. C. and 180 A. D. were neglected.

Physicians were not trusted, still they were made responsible, not only for individual cases, but for natural events. During an epidemic in Prague, 1161, on the charge of having poisoned the wells, eighty-six Jewish physicians were burned to death. Before the time of Pope Urban IV, hundreds were burned. John of Bohemia, the same who fell in the Battle of Crecy, suffered from his eyes. In Breslau he consulted a French oculist; because he could not cure him he was drowned in the Oder; and centuries afterward Helmont was imprisoned by his Bishop

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because he doubted the therapeutical competence of religion.

Pietro d'Albano followed the teachings of Arab medicine, the only one which clung to Hippocrates. That is why he was to be burned. But he outwitted them by dying in their dungeon, 1250 after Christ. But the pious people took their revenge on Cecco d'Ascoli, whom they did burn in 1257. Still Venice appointed in 1348 three physicians of public health, with the right to isolate houses and districts for forty days—the first beginning of our quarantine. During the fifteenth century large cities of Germany established the office of City Physician.

The period of religious reformation was also the source of some independent endeavor in medicine. It is true that Luther, Calvin, and Zwingli established incontestable religious autocracies in place of those they had overcome, but they could not help raising doubts and independent thoughts in many minds. Luther himself thought very little of doctors. He employed them, but did not pay them. He recommended his family physician to the Elector of Saxony by writing that he was all right and cheap; the only thing he ever gave him was a glass of beer. That was his clerical fee. Calvin did worse—he burned Serveto.

One of the mooted questions about that time was that of the Arabic and the Hippocratic venesection. It shows to what extent apparently small things may embarrass human minds, mainly when the stock of actual knowledge is small. The Arabic method consisted in the opening of a vein at a distance from the diseased part; the Hippocratic, in close proximity to it. Peter Brissot, professor in Paris, favored the latter and caused the division into contra-Arabists and Arabists. This dispute lasted long after Brissot's death, to the end of the sixteenth century. His teaching was claimed to be as heretical as that of Luther. But after a while the Faculty of Salamanca and Charles the Fifth, to whom appeal was made, decided in favor of the Hippocratic method and of the dead Brissot.

About the same time Germans, Dutch, Italians, and Swiss studied botany, mineralogy, and zoölogy. Directly and indirectly therapeutics became enriched. The new anatomy

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was the best aid of mostly surgical therapeutics. For internal diseases blood-letting was still the main topic of discussion, and Botalli was the Bouillaud of the sixteenth century. His teaching, however, was declared heretical by the Paris Faculty. Drugs were nearly all vegetable, in very complicated formulas, mostly. Metals were disdained, but mineral springs were much used. Italian surgery was most benefited, German almost not at all, the French very much indeed. It was mainly Ambroise Paré (1517-1590) who rejected Vigo's doctrine of the poisonous character of shot wounds, ligated arteries instead of cauterizing, limited the use of the actual cautery in general, abolished castration as a part of the radical operation for hernia, introduced the truss, improved trephining, and treated the prostate as the frequent cause of strangury. Never was there a man who like him enriched therapeutics, never a cooler and less prejudiced mind (in spite of his participation in his century's belief in witches and sorcerers). "A remedy that has the stamp of experience is better than a new one that was just invented"—that is one of his principles which might be placed over the entrance of every one of our clinics. Nor was his courage of a low order. In the face of the jealous medical brethren who moreover hated him because he wrote French and not Latin, and of the supercilious courtesans, he denied the therapeutic effects of the fabulous unicorn, whose very existence he was bold enough to deny. By one of them he was furnished the final altogether incontrovertible evidence—"The king has at St. Denis the horn of a unicorn for which he refused 300,000 francs." No further proof is required.

The plague was mainly treated by the Theriac. Syphilis, an old disease, but very frequent about and after 1500, was feared by the regular physicians, many of whom ran away from it. Mercury soon became the general treatment, mostly in inunctions, also in fumigations and internally. Guaiacum was praised by Hutten. Cinchona, Sarsaparilla and Sassafras were frequently employed, but still the imagination of the uncultured people of all stations clung to astrology and the horoscope. It was—with a number of others—Paracelsus who in his iconoclastic

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furor cut loose from them. He claimed that the diseases should be named according to the drugs that cured them. In this respect he was imitated by Rademacher 300 years later. His principle of treatment was: "*Similia similibus.*" That was copied several hundred years afterward by Hahnemann. His main remedies were: Antimony, gold, mercury, silver, copper, lead, sulphur; but also preparations taken from those drowned or those cut from the gallows.

Chemistry obtained a certain degree of independence in the seventeenth century. Surgery and obstetrics made but little progress, but many new drugs were introduced, mainly ipecac and cinchona, which I mentioned. In the eighteenth century surgery advanced considerably in the hands of Petit, Desault, and Heister; the forceps was invented, and many an infant saved. Still obstetrics was murderous. One author boasts of losing "*only*" eight out of ten babies—forceps or no forceps. That is what, alongside with wars, pestilences, famine, and ignorance, explains the slow increase of population up to the nineteenth century.

Internal medicine gained rapidly in England (Mead, Huxham, Fothergill, Pringle) and Germany (Werlhof, Vogel, Zimmermann, Frank).

Altogether the evolution of both theoretical and practical medicine is due to the revolution taking place in scientific minds. Copernicus and Keppler, later Isaac Newton, prepared the medical world for unheard-of changes. Bacon of Verulam and Descartes abrogated the scholastic methods prevailing in all questions bordering on the science of man. Meanwhile Vesal founded anatomy, Harvey physiology, Morgagni pathological anatomy; Haller owned and enriched the sum of medical sciences; Priestley discovered oxygen, and Lavoisier the principles of the process of respiration and the meaning of oxidation; and John Hunter established medical experimentation.

Not long after Paracelsus the microscope was utilized. Kircher proposed the theory of a contagium arimatum in 1671; Loeuwenhock discovered real bacteria in 1675. Clinical observation and therapeutics, in spite of perverted

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theories, found its apostles in Sydenham, Boerhaave, von Swieten, Peter Frank, and Auenbrugger who in 1761 taught percussion, Corvisart who made people believe in it in 1808, and Lænnec who, guided by pathological anatomy, taught auscultation. Meanwhile, Bichat had demonstrated the morbid processes in the tissues in place of regions or organs, and his countrymen, while Germany in accord with its political depression and indolence was entirely given over to the obscurantism of what was called nature-philosophy—worked their way up into the great facts of pathological anatomy. Undoubtedly the parliamentary spirit of French politics awakened ambition and discussion. When the minds of Central Europe became sufficiently prepared both for an intellectual and a political revolution Rudolf Virchow took part in both. In the theory and practice of medicine, individual and public, he became the immortal leader.

Through all the previous times, viz., the first half of the nineteenth century, Great Britain had never deviated from its practical common sense. It contributed very little to the general knowledge, but it never was led astray by the wanton system of Brown, which had to look for proselytes in Germany and America (Benjamin Rush was its prophet), and the names of Travers, Williams, Crawford, Ashley Cooper, Charles Bell, Abercrombie, Marshall Hall, Cheyne, Pitcairn, Bright, Carswell must be mentioned in the very briefest sketch. To say that English medicine was without prejudice, however, would be wrong. The narrow uniformity of opinion, for instance, was such as to force candidates for a degree to swear they would never engage in homeopathy.

About and after the time of the Vienna nihilism nothing was thought of except nursing and diet, defective at that. The action of drugs was not known or appreciated. If diseases had their legitimate type it was not recognized. About 1860, however, therapeutics became acknowledged as the very aim of medicine, new methods were found, observation and treatment became more local, surgery, ophthalmology, laryngology, enjoyed the aid of new instruments of precision; physical remedies, electricity,

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warmth and cold became known, and therapeutics grew to be more prominent in the thoughts of the world both medical and lay. It was then that hydrotherapeutics began its career. For it was the time in which theories had been shaken, the people took more interest in their own welfare, discussions of all sorts were universal, and the political and individual dignity of man was recognized. All that happened though the contest between nations, diffidence, malevolence, jingoism, and cruel wars, were still the signature of the times. Only the fight against disease with the new scientific methods became the same in all countries. Evidently equality, fraternity, and solidarity begin in and through science and its application. The process is slow and the only consolation is that history is long. There is no longer a fratricide in science; there must come an era when there will be none amongst nations.

The modern improvement of therapeutics has resulted from the change of methods. In place of mere empiric observations the new experimental method was applied, as in all biological studies, to that of the effect of drugs, and the cause of disease and its results. Diagnosis began to include etiology, etiology suggested treatment.

A few instances of the extent to which etiology has modified our treatment in modern times are the following: A wonderful change in the practice of modern medicine has been worked by the extermination of teething as an alleged cause of disease. I may be very brief, for I state only what everybody should now know, viz., that teething is a physiological process which is not disturbed except by a serious constitutional disorder or a local anomaly in the bone or in the mouth. All the diseases which were attributed to dentition as a matter of course exist, but they have nothing to do with it. Slight indisposition of a nervous disorder requires no interference, but rickets, diarrhea, and convulsions demand a diagnosis and individual treatment. To the same degree, however, that the teeth of infants and children have lost their import as a cause of disorder, those of the adult have gained. Modern dentistry is one of the aids not only of comfort and beauty, but of health and longevity.

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There is another subject which is becoming of vast import. Rachitis is old in poor, abject, prince and war-ridden Europe, but was unknown in America until forty years ago. Immigration carried with it population, labor, wealth, rapid expansion, numerous new states, incentive to scientific efforts, also competition, tenement houses, subterranean dwellings, factories, woman and child labor, poverty, much tuberculosis, and rachitis without end. Before the law of the land will be so improved that the social conditions become humane, the skill of the physician will be demanded with his hygienic and medical treatment. Avoid the artificial infant foods, the use of unmixed cow's milk, prolonged maternal lactation, and bad air. Diagnosticate rachitis early when constipation beginning in the second month, softening of the cranial bones, undue perspiration of the occiput, slight beadings of the ribs, laryngismus, or cerebral congestion or hydrocephalus, suggest the diagnosis. When you diagnosticate early and treat early you may prevent sudden death, prolonged hydrocephalus, secondary idiocy or imbecility, and lifelong deformities. Air and mixed food, animal broth and cereals, cod liver oil and phosphorus and bathing—all of them easy to procure, even by the poor—yield a proof of what therapeutics guided by diagnosis can accomplish.

Hereditary syphilis is now known in many of its late and modified results. Everybody knows its symptoms as they appear immediately after birth or in the second month. Everybody knows at present, or should know, that by causing hyperæmia on the places of apposition it favors rachitis, but also early hyperostosis with but little deformity; that it increases the size of the head in the first half year of life, but less than rachitis, which continues to have that effect permanently; that it may by inflammation of the interstitial tissue, the periosteum, or the blood vessels cause hydrocephalus, which may, when recognized, become accessible to treatment; that it interferes with the general development in the shape of what Fournier called meta-syphilis to such an extent as to render children of six or eight years, with no apparent illness, puny and sickly. Through knowing all this we find our therapeutics of a

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great many ailments and imperfections of children vastly improved; the little invalids gain flesh and color and vigor, and permanent health, not with arsenic, or iron, or other roborants, but with mercury. I know of no greater addition to the welfare of society through drugs than this, and no greater reward to the careful diagnostician of a condition which is quite frequent.

Since in our own time a number of insects have been found to be the carriers of both infectious and contagious diseases the benevolent friends of our animal neighbors have reason for anxiety and lamentation. For malaria is communicated by the musical anopheles mosquito—no courtesy seems to be extended to it though it is only the female that sings and stings—the filaria disease by culex and anopheles; yellow fever by stegomyia fasciata, the sleeping sickness of Africa by glossina palpalis, the relapsing fever by the vulgar bedbug whose attractions do not grow by being called cimex lectularius, and the spotted fever of the Rocky Mountains (according to Wilson, Chowning, Anderson), probably by the euphonious dermacentor reticulatus. But lately the Piroplasma theory was denied by Charles Waddell Stiles.

Moreover, plague bacilli (Yersin, Nuttall) and those of cholera and of typhoid fever have been found on flies, and been connected with the action of fleas. That is why it appears that unless mosquitoes, bedbugs, flies, and fleas have some means of proving their indispensability to civilized society, their extermination as preventive therapy against fever and ague, yellow fever, relapsing, and typhoid fevers, and the rest of our scourges will not be regretted by the vast majority of mankind.

Long before insects were hunted up in their haunts, bacteriology and physiological chemistry appeared in the field. Their influence on the study of infectious diseases and the organic metabolism I take to be known to all, and shall not consider them for that and other reasons in the brief time at our disposal. The laboratory has proven an addition to our knowledge, to our practical success in curing and preventing disease, and also to the methods of those who are taught to work with them. That is why I am

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quite ready to subscribe to what your own Chittenden proclaimed only a year ago, viz., that the laboratory teaches the student to see and to think for himself, that it affords that training which leads to the development of the wise and skillful practitioner of medicine, and it shows him how to throw to the winds the writings of others and to believe what he has himself seen. But the student should not forget that the eye sees only through the brain that controls it, that it takes time and long honest effort to train it, that there have been and are other eyes and other brains besides his, and that the wide world of medicine with its aims and obligations lies far beyond the walls of a single laboratory, or of all the laboratories, and that all of them find their center in the clinical ward, at the bedside, in municipal and state sanitation, and all the hygienic and social interests of mankind.

Unfortunately the opportunities for practicing both senses and brains in clinical wards are not numerous in the medical schools of the United States. They will not improve until each school has its own hospital. The state universities or individual rich men and women can take no better part in the promotion of the welfare of the people than by seeing to it that no young man begins his work amongst the public at large before he has obtained general experience in a hospital under the eyes of his teachers. Remember the Scotch king of olden time who licensed a doctor only after the applicant could prove a twenty years' practice amongst his enemies.

The observations at the bedside do not always bear out those made in the laboratory. Clinical experience, when repeated untold times, precedes quite often its reaffirmation by experiments. Therapeutical methods when firmly established are often contradicted—for the time being—by the insufficiency of laboratory methods. Such an instance is in our modern therapeutics the use of alcoholic beverages in septic fevers. Modern laboratory results tell us that the administration of alcohol before a dog, rabbit, guinea-pig, pig, mouse, or chicken is exposed to the action of a narcotic virus, makes it more susceptible; that five ccm. of absolute alcohol when given to an animal of one

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kilo is a fatal dose. That is true, and what does it prove when this observation is applied to a man of seventy-five kilos? (S. Meltzer.) It proves that it is worthless. For that man was never given for therapeutic purposes 375 ccm.—twelve ounces—of absolute alcohol so long as the world was created. Besides, it would never be given in one or two doses, would not be introduced into the stomach by a tube, where it would coagulate the albumin of the tissue and cause ulceration, but it is given in dilution, in small and often repeated doses, and is slowly absorbed. Besides, the infection to which the animal is exposed in the experiment is a sudden one; it is overwhelmed by it, and dies. Man when infected receives a certain amount of infection only; while it multiplies in his circulation it creates an adequate amount of antitoxin, which aids the alcoholic beverages in its antiseptic action.

We are told by some that alcohol increases blood pressure, by others that it does not. We have reason to believe that it is a depressant for the nerve centres, but also that it causes the contraction of a muscle when applied to its motor centre, that it lessens the heart beats when applied to the periphery of the vagus nerve, and dilates the blood vessels of the submaxillary gland when applied to the chorda tympani. Alcohol also flushes the face by stimulating the vaso-dilators; and by irritating the tone of the vaso motor centre it stimulates normal function in the peripheries. Thus it counteracts the force of an infection which dilates the vast territory of the splanchnic nerve, with the high internal temperature and cold extremities; that is why it is beneficial in collapse when administered in the bold doses that are indicated. When Meltzer, whom I am glad to follow in his reasonings, founded on physiological experiments and ripe clinical experience, adds to these considerations that one ccm. alcohol per kilo given in twenty-four hours furnishes 500 calories to a man weighing seventy-five pounds, he furnishes an additional proof to the benefits to be derived from alcoholic beverages.

The 375 ccm. of absolute alcohol mentioned before, correspond to a litre of strong whiskey, two bottles of port or sherry, or six bottles of hock wine or claret—doses

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hardly ever given or required. The whiskey or brandy is hardly ever given undiluted; because in that condition it shares to a certain extent the methods in which the laboratory workers kill the poor animals and thereby try to convince us that alcohol is as reprehensible as morbid fanatics want us to believe. But practical observation shows us that there is at the present time no antiseptic which can be administered internally of equal value with alcoholic beverages. The worst forms of typhoid infection die without them; the septic forms of diphtheria which are inaccessible to antitoxin may still be reached by whiskey or brandy. In this seemingly hopeless condition it may be life-saving. Theoretical objections, ethical opposition, should not count. A child of three or four years may be saved by 100 or 200 ccm. of whiskey given daily, if by nothing else, and escape the undertaker.

There are many other apparent incongruities between laboratory and therapeutical experiments. Both must be considered of equal value, when repeated a sufficient number of times, in determining the practical value of a method or remedy. It must be understood, however, that in internal medicines we require large numbers of observations, for the human organism is not a test tube in which the external circumstances are always uniform. That is why the observations in operative medicine are in comparatively small numbers, apt to be more correct than those in which, in internal organs, the blood or the nervous system are to be reached by drugs or by imponderables. To the class of remedies belongs also water in its manifold therapeutic use.

Hydrotherapy is very old. Hippocrates and many after him knew its beneficial effects. It was a power in medicine as it was in the imagination of the people that used water in the fight against demons and disease. A vessel filled with water stood in front of the dwelling that held a corpse, one was thrown after it when it was carried out, the participants took a bath, the body was interred beyond the river, the sick would go into the water like, according to Bartels, the Moquis when they had fever, to keep away the demons. Modern hydrotherapy, however, has returned

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to Hippocratic principles. It does not mean cold water alone, hot water alone, or a single method for its use. The knowledge of its usefulness is not due, as the credulous multitude would have it, to the inspiration of a coarse Silesian peasant; it finds its indications in the teachings of physiology and the rational observation at the sick bed. The cold which contracts the blood vessels must increase blood pressure, the specific gravity of the blood and the number of erythro- and leucocytes in the capillaries; the warmth which dilates the blood vessels lowers blood pressure. The effect of different temperatures depends to a great extent on the condition of the body at the time of the administration. That is why cold applications in scarlatina or measles are not indicated, but cold affusion in a warm bath or immersion in cold water with subsequent warming; why hot bathing in cerebrospinal meningitis has been advised; why in 1850, while in charge of a cholera hospital I could employ the hot immersion, afterwards recommended by Rumpf, of cholera patients; or why foolhardy patients with myocarditis are occasionally carried out feet forwards from a Turkish bath establishment. The Romans knew some thousands years ago that "when two do the same thing it is not the same thing."

There are other remedies of great value which are waiting for experimental laboratory corroboration of their effects. To that class belong arsenic as a nutrient and nerve, and phosphorus as a tissue builder, in sub-acute and chronic inflammations of the bones and in rachitis.

In approaching the subject of modern means of therapy let me beg your indulgence for hardly mentioning to-day sero- and organo-therapy. Time is short and opportunity fleeting. We all, I think, agree about them, and the action of antitoxins—those we have now and those that are sure to come, and their preventive influence in diseases and epidemics. We know, for instance, that in the war of 1870, the German army, vaccinated and revaccinated, lost of smallpox 459, the French 23,000. With the growing interest in them, shared by all of us, the scoffing detraction of drugs will, however, make itself heard over and over again. That is why I crave the privilege to say again, as

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many times before, that I believe in medicines of all kinds provided their action is understood, and they be given in proper cases, and doses. Iron in the shape of a pill is as welcome as iron when used as a knife, or a saw, or an artery clamp.

Permit still another word on laboratory work in medicine in general and therapy in particular. Nearly all people agree nowadays on the subject of animal experimentation. Still it is claimed by its enemies that mistakes may be made and have been made, but it is admitted that the most important progress in modern medicine could not have been made without it. The claim that even medical men have joined the ranks of what they like to call themselves—"anti-vivisectionists"—can be substantiated. What of it? Operative dexterity which cleans out a pelvis as neatly as if it had been done by that great and humane medical gentleman, Spencer Wells, does not prove its living or dead possessor to be ethical or a friend of anybody but himself. The knowledge of the action of the roots of spinal nerves, their differentiation into motor and sensitive fibres, the localization of cerebral faculties, of the centres of temperature, respiration, speech, sight and hearing, the functions of the stomach, intestines, and the visceral and ductless glands could not have been accomplished without animal experimentation. A great many remedies—strychnine, curare, tuberculin and antitoxin, immunization and sero-therapy could not have been studied without it. Tens of thousands of diphtheria and hydrophobia patients saved, and the increased knowledge promising future curative procedures in tuberculosis, pay amply for the lives of rabbits and guinea-pigs sacrificed in behalf of the human race. The employment of anæsthetics has made experiments more than ever humane. Experiments on man, always shunned and condemned, have never been condoned by the medical profession; and better informed legislatures will rather spend their time and efforts on the suppression of quackery and fads than of the exertions undertaken in the interests of suffering mankind. Think of the preventive measures used for securing asepsis, the care bestowed on the patient, the air of the room, on dress-

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ings, on instruments, and particularly on the sterilization of the finest instrument of them all—the human hand. One-third of a century ago when you operated on a strangulated hernia it was discourteous not to invite every bystander to examine the wound; my great teacher in Goettingen, Conrad Langenbeck, a little over half a century ago, was professor both of anatomy and of operative surgery; forty years ago my surgical colleague in the New York Medical College amputated the limb of a corpse and a limb of the living in the same forenoon, on the same table, in the same purple gown. At the present time what therapeutical change! The very literature of hand-clearing grows daily. Carbolic acid solutions, fat, corrosive sublimate, alcohol, soap and water and brush, gloves of twine and of rubber, rival in their attempts at removing the innocent epiphytes of the hand, and the staphylococcus albus, and other still more harmful microbes, and to insure the success of an operation. And still there is the complaint of insufficiency of every method and the attempt at finding one more efficacious.

To extol here what laboratory work has done for public hygiene is superfluous, but it would be a mistake to identify hygiene and its teachings with the bacteriologic era. They always existed. Air, light, and cleanliness were always known to be necessities, the hygiene of dwellings, disinfection, sewage, the disposal of the dead, were discussed even in the Middle Ages when the rapacity of the petty and big masters and the sensuousness of the high clergy were the supreme rulers of society. Even in antiquity the plague of Athens taught its lessons, and if the heart-rendering description of Josephus of the destruction of Jerusalem be only partially true it must have been a source of instruction at least to the victors. Epidemics have always been great teachers, most impressive amongst them in modern times the cholera invasion of 1831 and 1854, the typhus of Upper Silesia which became immortal through the tale of horrors told by Virchow, and the typhoid epidemics of our own making during the Spanish war. Necessity was the mother of hygiene in England, whose large population on a narrow island, industrial development and misery,

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caused inquiries into the sources of morbidity and mortality, and the establishment of commissions since 1842, the Public Health Act of 1848, the creation of permanent, and general, and local boards of health, and the Local Government Board Act of 1871. We are slow in imitating the English example. If it were not for the Marine Hospital Service, whose duties and privileges are gradually enlarged, we should have no central sanitation of any kind. The attempts at securing for the most urgent needs of the people, its health and physical welfare, a representation in the central government at Washington have been treated with scant courtesy. There should be, however, for the purpose of prevention, which has obtained the most exact basis in bacteriology, a close connection between the state and central government and medicine. Social legislation is most urgently needed if human society means to emerge from its present low civilization.

Military medicine and hygiene were practiced to a certain extent by the Greeks and Romans, even the Persians had something of the kind. Cyrus is reported to have boasted in the presence of his father of having supplied the army with surgeons. Cambyses replied: "Do not speak to me of surgeons. They work like cobblers patching up injuries. It is much better to guard the men against falling sick." The Middle Ages were almost entirely without any such measures. France had its Ambroise Paré in the sixteenth century; England its Pringle and Brocklesby; it was the first to establish a school for military physicians, that at Netley, in 1854. No country has done more for the military hygiene than at a certain time our own. The Civil War acted like a political, moral and scientific thunderstorm. The young and active Surgeon General William Hammond lent his hand and power to the Sanitary Commission composed of volunteer medical and lay citizens. The camps were kept clean, the men were clad and supplied with medicines and physicians, the pavilion system of hospitals introduced, non-military doctors were appointed to report on them, and epidemics were traced and stamped out. The Geneva Convention of 1863 was in part the direct result of what had been learned in America, and

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nothing could have been warmer than the enthusiastic eulogies conferred upon our achievements by Rudolf Virchow. But then again in 1900, he then nearly eighty years old, asked me: "Tell me about your horrors of Chickamauga and Montauk. Why do you kill the vigor of your land before they smell powder? Whose fault is it?" You all know that it was the disregard of all the best known laws of hygiene and preventive therapeutics that destroyed hundreds that should be alive now.

A few minutes ago I spoke of the necessity of giving medicines in proper cases, times, doses. It is not long since the therapeutics of infancy and childhood attracted the attention of the profession very closely. In it hygiene and medication are accurately interwoven. A thousand books and essays have been written within a dozen years on the prevention and cure of infant diseases. The number of mothers, however, that nurse their own babies has not increased, and the teaching of artificial feeding made but little progress. The main theoretical advance is the warning against proprietary foods, which to judge from the array of expensive advertisements do a great deal of good to the manufacturers. That warning seems not to be heeded by the public, for the advertisers are not yet sick of their bargain. Another step in the right direction is the attempt at securing a germ-free and pure cows' milk; it has been successful to a limited extent. There are those, however, who, in spite of better teaching, will feed un-mixed cows' milk and refuse to learn that cows' casein is not woman's casein, and cows' milk fat is not human milk fat, or that pasteurizing or boiling will remove some of the dangers caused by microbes to which city milk is exposed. Or when they do boil it, they will kill the milk by over-boiling and complacently tell you they boil it—and then they call it "sterilizing"—thirty or sixty minutes; and they ruin the baby's health and give it scurvy. They have been taught—and so have we—these thirty-five years, by physiological experiments that everybody may imitate, that a certain amount of starch combined with vegetable albumin in the cereals is digested by the very newborn, and improves the assimilation of the milk of the cow,

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which never can be made human, no matter whether you call it "modified" or "certified."

There are conditions in which even in cereal suspensions cows' milk is not tolerated at all. In the hot summer of 1854 the babies in New York were born to die of gastro-enteritis. Bad cows' milk, the heat of the tenement houses, and my ignorance worked hand in hand. I met two older colleagues at a street corner and threw up my hands in despair. "Stop milk," said one. "Starve them," said the other. Add to cereal decoctions, my young friends, as much germ-free milk as will be tolerated, generally very little indeed, and the white of eggs, and air if it can be had by day and night, and bathing, and you have the main roads leading to the salvation of your babies. There is wholesale preventive therapeutics for you.

The therapeutics of old age—a relative term—as many a man is physiologically older at fifty years than another at eighty—has improved with a better knowledge of arteriosclerosis. Is it possible to treat it as a uniform entity? It results from the unavoidable arterial changes beginning, according to Thoma, in the thirty-fifth year. It is increased by either sedentary or over-active life, by the extremes either of animal or of vegetable diet, the former resulting in ptomaines, the latter in calcareous deposits; by abuse of tobacco or alcohol; by syphilis or other infectious diseases. Who is there to pretend that there must be a uniform treatment? It is true there are certain rules to be obeyed in every case. Let the food be mixed, small in quantity, poor in calcium, oxalic acid, and chlorine. Give milk and alkalies, as you do in diabetes and in uric-acid diathesis, in food and as medicines, perhaps in the form of lactates. Give antisyphilitic treatment in proper cases, mainly of those who are of a comparatively early age. The ergotin recommended by a modern author (Rosenbach) is contraindicated still more than strychnine, which is rarely tolerated by those whose heart-muscle is subject to atheromatous or interstitial changes. Employ cold water in friction only, never as a bath. That should be warm, not hot. Together with warm bathing iodides should be given for its dilating effect, as Huchard first pointed

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out, on the smallest arteries. The same result is accomplished by nitrites, by aconite, and by opiates; arsenic may be tried for its action as a nutrient and a nervinum, and occasional doses of calomel when the kidneys are normal. Otherwise beware of calomel, though it was one of the greatest remedies extolled by Benjamin Rush. Together with venesection he speaks of calomel as the "Samson of medicines," forgetting that Samson slew three thousand. Exercise should be modified according to the case, also passive movements and gentle massage; and the use of carbonic acid in the warm bath may be expected to act as a gentle stimulant to the countless blood vessels.

Medicines and doses have to vary. But to believe that a mathematical proportion, determined by age or by weight, can be relied upon is fine reading in books, but it does not correspond with what nature has ordained or permits. Perhaps some instances which I am going to give you, my young friends, do not correspond with what you believe you know. But listen to a few fragments.

A baby, say of one year, must have, according to the books, one-twentieth—some say one-fifteenth—of the dose of an adult. Now take that baby with enteritis; a severe diarrhea exhausts the body; ten per cent. of its weight may be lost in a day and hydrencephaloid may be the result. That baby should have, and bears, with other medicines directed against the local affection, one-thirtieth or one-fortieth grain of opium every two hours. It bears it well. I have given it more than fifty years, and I have attended tens of thousands of babies. They tell us opium will sometimes kill in small doses. So it may, but not if you keep your eyes open and watch the effect of the first or the fifth dose. It may kill adults as well, unless watched. There is such a thing as idiosyncrasy, no matter how it is explained. According to the schedules, the adult would take one-half or one-third of a grain of opium every two hours in the same condition, and that would be a large dose for him. Accordingly opium should be watched more carefully when given to the adult than to the baby.

Give an adult one grain of extract of belladonna daily, and soon it will prove an overdose. Give a baby of one

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year with whooping-cough, or a larger child with incontinence, one-quarter, one-third, sometimes one-half grain daily—which would correspond with the proportionate schedule dose for an adult, of five or eight grains, and no such symptom will appear.

Five grains of potassium iodide I have seen give a gigantic adult salivation and œdema of the face, neck, and glottis; a meningitic baby of two years will take without the symptom of over-dosing two drachms daily, for weeks.

A syphilitic baby a month old takes one-quarter grain of calomel three times a day for months; the only thing that happens to it is that it gets well. Give a proportionate schedule dose to an adult for a week, and he has a salivation, no teeth left in his mouth, and you have a well-deserved suit for malpractice.

Give one-sixtieth grain of corrosive sublimate in a half tablespoonful of distilled water every hour for three or five days to a baby of six months, and its laryngeal diphtheria will or at least may get well, and it shows no salivation, no vomiting, and no diarrhea. Give the schedule dose—twenty times as much—to an adult, and he will have salivation and be a horror to his friends, and may perish with mercurial poisoning.

Heart stimulants are borne and required by the young in much larger doses than by the adult. Let me speak of digitalis only. I expect you give your medicines in order to obtain an effect. To give it in such small doses as to produce its action after a week, is superfluous. I do not advise giving placebos except when you have to doctor the patient's prejudices or neurotic aberrations. "Whoever does not know how to stimulate when it is required does not know how to cure." Now a baby of a year will take five drops of a good tincture of digitalis every two hours, but even so you may see no effect for a whole day. Give the drop or the half drop you read of in the books, and you are perfectly safe as far as a court of law is concerned, for nobody can prove you injured your patient directly—but you overdo what they like to call expectant treatment, which is no treatment and no care, and no cure. Give

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the schedule dose, that is, fifteen or twenty times as much—that would be a drachm—to an adult. He will not bear it.

I beg of you study your cases with more of an eye on the patient than on the book; and now and then believe an old experience rather than a young, and sometimes fresh, treatise.

What I claimed in Rome in 1894 still stands. We all agree that over-dosing is wrong and harmful, but also that it is being practiced. To give mercury to salivation; salines until the rest of soluble albumin and salts is gone; digitalis until the pneumo gastric nerve is over-stimulated into vomiting and collapse; belladonna until the throat is as hard as a gridiron, and the pupils like wagon wheels; quinine until your patient gets deaf; iron until gastric catarrh and constipation destroy what was left of health; to burn and saw noses for everything in the line of ailment that may befall the flesh; to put glasses on the nose of whosoever is epileptic, or lame, or demented; to prescribe acetanilid because an advertising manufacturer says it is your sacred duty to him and his bank account; to cut the cervix uteri for endometritis and sterility; to sew up the same with the same end in view; to cauterize and otherwise handle the problematic ulcerations of the uterus for endometritis and sterility; to introduce daily or twice a week tampons of glycerole for the same purpose and with the result of causing or increasing parametritis—these and many more things, most of them awfully modern, are abominations created sometimes by defective or vicious theories, and now and then by the thoughtless generalization of occasional indications.

In connection with the foregoing I beg to add: Neither a deluge, nor an absence of drugs makes the physician.

The first indication in therapeutics is a correct diagnosis. The most efficient treatment is local, and the cause, seat, and essence of a morbid process should be known, or at least sought for. The most promising therapy of the future—sero-therapy—owes its origin to nothing but an accurate bacteriological diagnosis.

Most diseases have a tendency to get well either com-

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pletely or partially—contrary to what you may read in S. H. Dickson's "Syllabus" of 1835. He says: "The tendency of all forms of diseases is to death." The average of death rates, however, is 1:35 diseases,

But a partial recovery is no recovery. Mere escape from immediate death is no unmitigated blessing; invalidism of a person that had an opportunity to get entirely well may be the sin of omission on the part of the doctor. He should mitigate symptoms that by themselves add to the dangers of the morbid process; for instance, high temperatures that can not be expected to belong to the average course of a toxic process should be lowered, for high temperatures may become a danger independently of the original disease. Or a disease which runs its typical course with a possible, or even probable, tendency to get well, should be cut short; a developing whooping-cough may thus be shortened by two or three months and the patient spared the dangers of a broncho-pneumonia which may accompany the cough at any time. If nature is sure to terminate a whooping-cough in four months when not interfered with, she is cold blooded and impartial enough to terminate the child before the four months, or even two, are completed. Or when you know that every day of your pneumonias will weaken the heart until possibly no strength is left to overcome the crisis you should not wait with your heart stimulants. Your name is not Micawber.

What not to do is as important to know as is what to do. The days of craniotomy or craniectomy in microcephalus have passed away except for those who malpractice medicine; in idiocy they are still, or may be still, indicated when its cause can be ascribed to trauma, abscess, or tumor; so they are in all tumors of the brain when they are accessible to diagnosis or the knife; or in those of the cranium or periosteum—mostly sarcomata, fibro-sarcomata, or osteomata—which encroach upon the brain. In all such cases, when the indications were correct, operations on the brain belong to the pia desideria of olden times which since became realities. That the hydrocephalus of the lateral ventricles or a tubercular meningitis should be attacked by the physician's knife, nobody was bold enough to hope

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a dozen years ago. They are still amongst the possibilities and venturesome achievements. I wish we could say as much of the most distressing and most discouraging cerebro-spinal meningitis, which as much as anything I have experienced in a long life proves to what extent man may be humiliated by the knowledge of his impotence.

Lumbar puncture, as advised by Quincke in 1891, and practiced innumerable thousands of times, has only in part added to our means of salvation or relief—indeed, less than it has to that of diagnosis. The cerebro-spinal fluid, if no longer normal like that found in serous meningitis, may contain more albumin and leucocytes in cases of other forms of inflammation, or blood, pus, staphylo-, strepto-, pneumo-, and meningo-cocci, and tubercle bacilli. By reducing the quantity of cerebro-spinal fluid, when frequently repeated—only fifteen to thirty or thirty-five ccm. should be withdrawn at one time—lumbar puncture may take the place of the direct puncture of hydrocephalus; it has reduced the headaches of congestion, of chlorosis, of lead poisoning, relieved spasms, unconsciousness, and coma, and resulted in a few undoubted cures. It allows the injection of cocaine into the spinal canal, first advised by Corning, for the purpose of causing anæsthesia during operations. It is a valuable asset in the modern era of therapy, though to what extent it will prove so in the epidural injections of tetanus serum (into the cranial cavity or) into the spinal canal, as is claimed by F. Cathelin in tabic crises and in lead colic; or of saline solutions into the latter in incontinence of urine, spermatorrhea, and impotence—remains a problem for the future to solve. But more and more it will be our destiny and duty to look for a treatment that is as local as possible. A trifling subcutaneous injection into the chest wall will immediately relieve a distressing pain of pleurisy; a soluble tablet of morphine, or a few drops of Magendie's solution applied to the irritated throat will relieve an exhausting pharyngeal cough more effectively than a much larger dose of the same drug when taken internally.

Amongst the local treatments we may count many modern measures; for instance, the strapping of the chest for

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intercostal or for pleural pain, the forcible protrusion of the lower jaw in attacks of whooping-cough, Kilmer's close-fitting jackets to moderate them; bandages and apparatuses, and the use of adhesive strips according to Rose and Rosenwasser, for dislocations of the bowels, uterus, kidneys, and heart.

The benefit derived need not depend upon the correctness of all the theories applied to the malformations; for instance, dulness over the ensiform process does not always mean anomaly of the heart, mainly in a short thorax; a low hanging heart does not always mean ptosis; an underfed neurasthenic or a chlorotic woman with great motility of the feeble connective tissue will not be cured by mere plastering. Still it does good, and simple it is.

If your patience is not exhausted I request you to follow me in the briefest possible retrospect of a few of the important therapeutical achievements of the last half century.

One of the greatest is the invention by Pravaz, 1858, of the syringe for subcutaneous injections. For local therapy in general and the local anæsthesia as taught by Schleich it has proved invaluable.

Tracheotomy as practised by Trousseau, in 1851, in America by Waldemar von Roth in 1858, has saved thousands of croup children, and our Joseph O'Dwyer's intubation has proved still more blissful. The operation for abscesses of the pleura and the lungs, since Lurde invented the trocar in 1765, was perfected by Trousseau, by Bowditch, 1852, Dieulafoy, and 1879 by Estlaerder. No one is here who has not performed or seen these operations. Let the progress made by the average physician be measured by the fact that the greatest French operator, Dupuytren, when his empyema was diagnosticated, refused to be operated upon. He preferred, so he said, to fall into the hands of God rather than of man. So he did, only fifty-three years old, in 1835, only seventy years ago.

The extensive kidney surgery was initiated as late as 1869 by Gustav Simon of Heidelberg.

Modern gynæcology dates from Marion Sims. Altogether the United States has contributed largely to the advance of therapeutics. Since McDowell performed the first

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successful ovariectomy in 1809, Nathan Smith, John and Washington Lemuel Atlee, Alexander Dunlap, Edward Randolph Peaslee, Charles A. Budd, and a host of modern operators have carried the renown of American ingenuity and daring all over the world. When in 1850 I assisted—in a minor capacity—my teacher Wutzer in Bonn in his attempt at closing a vesico-vaginal fistula (he was the only one besides Jobert de Lamballe who in Europe dared to do so) I heard the name of Marion Sims who a year previously had scored the first complete success. I still have in my possession the clumsy flat speculum used by Wutzer. Sims' speculum, which was invented in 1846, we did not know. In regard to its value Robert Olshausen proclaimed in 1896 that without it the operations for prolapse and fistula could not be performed, and that the extirpation of the uterus and its adnexa, and the vaginal operation for myoma could not have been thought out. In 1854 Nathan Bozeman operated successfully on vesico-vaginal fistula complicated with laceration of the cervix. The silver suture of Marion Sims was a great triumph when proposed in 1852. So was Battey's castration operation of 1872, simultaneous with that of A. Hegar in Germany and Lawson Tait in England—both very useful, but also very dangerous to the morals of doctors and women, and therefore, both praised and censured. Long before (1830), Hugh Lenox Hodge invented his pessary, whose picturesque history is given by A. R. T. Penrose in his eulogy on the inventor (1873). He was the same, though, who marred his renown by the bitter opposition to Oliver Wendell Holmes, who, like, after him, the unhappy and immortal Semmelweiss, taught the contagiousness of puerperal fever and the possibility of its prevention. That has been proven by the mortality of women in confinement falling from 16, 4, 2, to 1, $\frac{1}{2}$, $\frac{1}{4}$ per cent. and less. Let me add the illustrious name of Alonzo Clark, who in 1841 advised the opium treatment in peritonitis.

Is there nothing else? The greatest gift America has given the world is not the realization of a republican government—ancient culture exhibited it before and allowed it to perish by political short-sightedness, lust of

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conquest and expansion and undemocratic jealousy—it is anæsthesia. For the other therapeutical boon in this new era of therapy we have to look to Europe—it is antisepsis and asepsis. Operations on the skull, ear, and brain, the spinal cord, including lumbar puncture, the bladder and prostate, and the abdominal organs, have become so numerous that those who enter the profession at present cannot comprehend the amount of labor and acumen required for their perfection. I have only a word of warning in regard to them. Do not believe that every case of peritoneal tuberculosis operated upon owes its recovery to the operation, and do not find a justification for an operation in its immunity from danger. It is true that the temptation, sometimes not justified by its results, to perform a laparotomy for the purpose of arriving at a diagnosis is very great indeed (for corrosive sublimate, iodoform, and soap and water protect you and your patient in most cases—by no means in all)—and the public, mainly the female half, have developed an incredible greed of operations within a few years. But the mere inspection of the abdominal cavity should not take the place of brains. There are a great many ways of arriving at a diagnosis; to utilize only one, and that one not always without risk, is unworthy, unscientific, and immoral.

Ophthalmology has become a new science and art since the invention by Helmholtz of the scope, and by the epoch-making work of Albrecht von Graefe; the number of the blind would be smaller if Credé's treatment of the eyes of the newborn were appreciated more thoroughly by the practitioner.

The ear, the nose, and the throat have become accessible to direct treatment. A mastoid operation when complicated is a great personal triumph, and frequently life-saving. One in twenty bone operations on the nose will prove beneficial; the removal of large adenoids improves respiration, hearing, the intellect, and facial beauty; what I mostly miss is after treatment; mild but systematic irrigation should follow the operation for months in succession; the resection, not exsection, of the hypertrophied tonsils may have similar effects, but by far not to the extent that

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is claimed, for the theory that the tonsils are the main inlet of infectious diseases, such as diphtheria, scarlatina, and rheumatism, will have to be modified to a certain extent. The tonsils are surrounded by a firm membranè. Dozens of years ago I could prove that diphtheria when limited to the tonsils was least dangerous. The thousands of other lymph bodies disseminated in the fauces and posterior nares are more guilty than the two dozen which form the tonsils. It is they that should be considered in the preventive treatment of all the infectious diseases of childhood. That is why the claim of a modern writer that he can prevent tuberculosis by the exsection of the tonsils, which very few men besides himself, according to his categorical opinion, are able to perform—should be taken with more than the customary grain of salt.

Kussmaul's irrigation of the stomach for volvulus and stomach diseases has opened the way for many additions to treatment and diagnosis, to dosing and to over-dosing. The œsophagus is, however, not labelled "this way in." Stomach sounds have a way of piercing a carcinomatous wall, of rubbing against an ulcerated stomach, and being unfriendly in general. The presence of hyperacidity, which is not the demi-god of some, but a symptom of many different conditions, permits its employment once to ascertain the chemical nature of the fluid; to repeat an indefinite number of office performances may be entertaining to the patient, which is doubtful, but it is no longer therapeutic morals or wisdom. Indeed, the frequent punishing of the gastro-enteritic baby with the stomach tube, which was a pleasurable occupation a few years ago, appears to lose its allurements even to the pediatricist.

Billroth's resection of the pylorus, 1881, has started a brilliant series of operative procedures, amongst which gastro-enterostomy and the removal of parts of intestines for the purpose of circumventing and starving malignant tumors, have proved successful. Another starving process of tumors by cutting off their arterial supply has been suggested by Dawbarn.

Robert Weir's most ingenious utilization of the appendix, fastened in the abdominal wall, for the purpose of flush-

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ing the colon has greatly facilitated the treatment and actual cure of otherwise inaccessible intestinal ulcerations.

Our knowledge of the congenital or infant stenosis of the pylorus, though it is limited to a few years' experience only, has undergone its changes. It is no longer an exclusive property either of the operator or the undertaker. Gastro-enterostomy will be performed in but few cases. For the majority are spastic, and depend on faulty mother's or cow's milk, over-feeding, hyperacidity, constipation, mainly that form which I have described as "congenital constipation," or on nerve irritability, which need not in later life lead to general neurasthenia, but resembles the isolated gastric neurosis of the adult male or female; it should be treated by the regulation of diet, change of milk, opium, belladonna, lime water, magnesia and bismuth, and large enémas.

In the treatment of blood diseases the simple infusion of sodium chloride solutions, with or without the addition of sodium carbonate, has taken the place of the transfusion of defibrinated or pure human blood, not to speak of the attempt, made thirty years ago in New York, at substituting goat's milk. As hæmostyptics, antipyrine in strong solution, adrenalin, and gelatine have replaced or supplemented ergot; as physiological blood feeder, the inhalation of oxygen has proved successful, both by clinical observation and direct experiments; and the circulation of the blood is remedied by a change in the position of the body, by hydrotherapy, by the action of digitalis on the vagus, by that of nitrites, aconite and iodides on vaso-motors, and in congestive diseases of the uterus and the spinal cord by that of ergot.

Bier's treatment of tuberculous joints by obstructive hyperæmia appears to act both by the retardation of the circulation and utilization of the anti-toxic effect of blood serum.

Venesection is beginning to meet again, in appropriate cases, with deserved favor. The fanaticism of Bouillaud will not return, and no Cavour will be killed again by medical blood-letting. But the last few decades have developed at least a few indications. In venous obstruction

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depending on disease or disturbed function of the heart, in pulmonary œdema, in the intense cyanosis and dilatation of the right ventricle during the third or fourth day of an unusually severe pneumonia, in the poisoning of blood with urea or carbon oxide, venesection should find and has found a foremost place amongst our remedies.

Atrophy is surely benefited by rectal and by forcible feeding, the latter either through the nose or the stomach tube.

Neurology has enjoyed half a century filled with progress. Narcotic alkaloids have taken the place of the drugs. Chloral hydrate began its therapeutic career in 1869, and a large number of good and bad synthetic remedies made their appearance within half a generation. The worst of them all is acetanilid, which must not be called publicly by its patented or by its disguised name for fear of a lawsuit. It is a strong aniline poison, has caused many deaths, and innumerable cases of cyanosis and heart-failure by decomposing hemoglobin into methemoglobin. That is the same effect known of over-doses of potassic chlorate. That fatal change was discovered by Marchand in 1879, and explained the cases of poisoning by that so-called domestic remedy, which I had been reporting the previous twenty years.

Psychic diseases have been amenable to more effective therapeutics since their etiology was better understood. Ten per cent. are due to alcoholism, ten to syphilis, many to infectious diseases, part of which are preventable but not prevented. Of 460 cases of mental disorders resulting from infectious diseases there were 113 that followed influenza, ninety-six rheumatism, eighty-seven typhoid fever, forty-three pneumonia, forty-one smallpox, nineteen cholera, sixteen scarlatina, eleven erysipelas. Amongst the 113 influenza insanities seventy per cent. were influenced by morbid heredity, previous diseases of long duration, and mental overstrain. I dare say that at least one-half of these infectious diseases could have been prevented and all their results obviated.

Piper studied 215 cases of congenital idiocy. The following facts were found in the unfortunate histories: There was mental disease of parents or relatives in twenty per

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cent., tuberculosis of parents in fifteen, of grandparents in eighteen per cent.; in fifteen per cent., the father was a drunkard; in seven, syphilitic. Amongst seventy-five cases of acquired idiocy, twenty-nine per cent. were attributed to scarlatina complicated with diphtheria, twenty to a fall, thirteen to rachitis, twelve to measles, six to protracted labor, one each to a moist dwelling, to forceps application, to renal dropsy, to typhoid, to trauma of head, and to insolation. Almost every one in this number could have been prevented.

Great modern additions to our therapeutic measures are the Röntgen rays, probably radium. I mention them without claiming prophetic gifts. They may be highly valuable, though whoever looks for a panacea is always mistaken. Exaggerations of the antiseptic effects, for instance, of colloid silver in internal and external sepsis cannot annihilate its merit. I believe I have seen good results from the ointment (15:100) and from rectal injections of one collargol in 100-500 sterile water, in puerperal fevers and in septic scarlatina and diphtheria. In cerebrospinal meningitis it failed to act. Of Methylene-blue, I may say the same. These fifteen years since the first recommendations by Mosetig-Moorhof I have had it under constant observation in cases of inoperable intra-abdominal cancer. I use it internally only. Subcutaneously, it is cruelly painful. I cannot prove a total cure, but I notice reduction of the tumor, improvement in health, restoration of the ability to work, and retardation of the morbid process—sometimes for many years.

I shall make no remarks on the modern improvements of methods in the treatment of contagious or infectious fevers, except one, namely, tuberculosis; and I shall not repeat what is in the mind of all of us—domestic hygiene, diet, and sanatoria. There is a tendency yet to believe in sanatoria for the incipient cases only. The rich who go there or travel for their health from one salubrious place to another have a good chance to get well. The poor man who is sent for a few months will improve, learn some rules of diet and hygiene, be able to work for some time, and fall sick again, with an alternation of forced idleness

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and illness until the end, the usual end. He may have learned, however, to take some care of his sputum and to guard his family against contagion, as far as circumstances permit. The advanced consumptive, however, is the real danger to the family and the community. In any New York tenement house where there is one case of consumption there are more. A dying consumptive is a constant danger. It is he that should be removed to a healthy, comfortable place which need be no elysium, but a good enough place to die in without endangering the community. That is the only way in which epidemics of chronic diseases may become extinct. The hundreds of thousands of leprous of Middle Europe have disappeared; so have the thousands of sufferers from lepra in modern Norway. The same should be done with advanced chronic tuberculosis. A few hundred millions of our country's wealth would suffice to exterminate tuberculosis within a generation. Meanwhile, therapeutics need not be idle. The emphatic demand for tuberculosis sanatoria has so impressed the mind both of the public and the profession that no voice is heard any longer but that which extols sanatoria as the *only* possible salvation, and decries drug treatment. That is a grave mistake. We cannot say that any drug heals any disease by itself; it aids in a cure, it relieves symptoms, it regulates the circulation, it increases the power of resistance. That is what is meant by healing or by curing. That is what you may do in pulmonary tuberculosis, as in every other disease. Strength is saved and life prolonged by moderating cough and providing rest; the circulation you may regulate by stimulating and strengthening the heart and aiding it to overcome the pulmonary obstruction by drugs, and by employing hydrotherapy to regulate the circulation of the vast surface of the body; the power of resistance you may improve by choosing proper food; by helping the stomach and intestines to digest it, and by preventing auto-infection by antiseptics whose action is generally under-estimated. Auto-infection is not so inaccessible to treatment as the bacteria toxins in the cells of the tissues. The former is prepared on the surface of the mucous membrane, the latter is introduced from without;

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located in the cells, it cannot be reached by our antiseptic drugs, for bacteria, to be destroyed, require six times bigger doses than the organic cell; the latter would be destroyed before the former is reached. Auto-infection, however, being the product of faulty digestion, can be reached in the intestinal tract.

The reputation creosote has gained in the treatment of tuberculous patients is in part surely the result of its action on the alimentary canal. Whether it has any other we do not know. Whichever it possesses is better exhibited by the preparations, fluid or solid, of guaiacol, which forms the important part of creosote. These fifteen or more years since its use was recommended by Schüller I have employed it daily with good results. That I add arsenic, which is better tolerated in the form of arsenous acid than in the usual solution, and heart stimulants, and symptomatics, goes without saying. What I wish to impress upon you is not to neglect what is near at hand. While we are working for the admission of our patient to one of the few accessible sanatoria, he may die.

Perhaps it is human fate never to accomplish all that was intended, but a professional man who feels his duties and responsibilities to his fellow-man should have as little of the shortcomings resulting from ignorance or indolence as possible. Indolence cannot be cured, and the man who is possessed by it should go where no heart is required, into trade or menial occupations. Ignorance may be relieved through love of knowledge, or ambition, or love of mankind. Whoever has the latter may be made a good physician. At the same time he will be a good citizen. His interests go beyond the merit of the individual. Society is sick like its single members. Whoever is a student of causes will aid in correcting faulty results. The widespread diseases of the people beyond bodily ills are ignorance, poverty, and crime. Nobody knows that better than the physician whose hand is on the pulse of man. He knows that much of the suffering of the present generation is caused by hereditary influences. As long as the epileptic, the criminal, the imbecile, the dying consumptive, the syphilitic, the gonorrhœic are permitted to propagate their kind

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or spread disease the human race must kiss the dust. The object of medical science as represented in the profession must be to influence the opinion of the public and its legislatures in behalf of preventive physical, mental, and moral therapy. All that may seem far away and like a utopian mirage. But we shall not be the last to inhabit the globe. Compare it with what it was only five hundred years ago, two hundred years ago, and learn to believe in progress.

The problems of every good man who loves his neighbor, all his neighbors, are more apt to be brought nearer their solution by the knowledge and tact of the physician than by any other man. He knows how crime, that worst disease of all, is engendered and propagated; knows many of the causes, all of the results, of poverty, and takes a natural interest in the schools. The time has not come to place the physician, the medical profession, where it belongs. In part that is our fault; it is not *only* hard work and fatigue that keeps us away from the field in which the battles of the people for gradual mental and physical improvement are fought. Sages of all times claimed and predicted for the physician the first rank in the state and its councils—Socrates, Kant and Gladstone.

While hitherto when we spoke of modern therapeutics we have meant the bodily sick man or community, future therapeutics must be directed against all the faults and ills of all mankind.

EXPECTANT TREATMENT

WHEN fifty years ago I graduated in medicine, Samuel Hahnemann had been dead only eight years. His principal influence on therapeutics was not attained by his rejection of blood-letting, or by his "*similia similibus*" theory, but by his potential dosing by which he pretended to prove that a drug would exhibit its remedial power only, when no trace of it could even be found in the medicine a patient was furnished. In this way it was demonstrated, not so much by him as in spite of him, that the sick might recover without medicine. At the same time, based upon the brilliant achievements of Broussais and the whole French medicine of the first forty years of this century, the Vienna School, under Rokitansky, confined its research and its teaching to pathologic anatomy and diagnosis. For in the opinion of Rokitansky, medical science was limited to dead house studies, and the greatest Vienna clinician, Skoda, pronounced the axiom that a disease could be diagnosed, defined and comprehended, but there was no means to cure it. At the same time, to give a single instance only, Dietl treated 750 patients suffering from pneumonia without venesection and drugs, with a mortality of only sixty-nine, that is, less than ten per cent., and thereby proved that the alleged results of what was called homeopathy in those times were fallacies. He also confirmed the existence of what Hippocrates and hundreds of his followers knew as *vis medicatrix naturæ*; that is, the inherent tendency of many diseases, when not interfered with, to terminate in recovery. Even Wunderlich, of Leipzig, in his first period proclaimed that medicine should be science but not art. All this was proclaimed in spite of the teachings of one of the members of the Vienna circle, Hebra, who demonstrated daily that many local diseases, hitherto considered incurable, could be cured by, and absolutely required, local treatment.

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That nihilism was based on the harm which was constantly done by the polypharmacy of former practices, and the nastiness of their theriacs and other compounds, and partly on the lack of knowledge of reliable medicines and of their action. No nihilism, however, could after a while withstand the growing influence of pharmacology and of systematic experimentation; but what has been called expectancy has taken its place. Expectancy and expectant treatment mean, if anything, the method of observing the course of an illness and the indications for treatment, with the express understanding that treatment with drugs should be avoided except under the most urgent necessity recognizable even to the average observer.

The somewhat fragmentary remarks I shall make are written for the purpose of justifying treatment, and particularly medicinal treatment, to a greater extent than writers appear anxious to permit, to no greater extent, however, than farsighted practitioners justify by their practice. What I shall have to say I want to be understood as a plea for timely and energetic medication and for the suppression of the very term of expectancy as needless and misleading.

Expectancy in treatment has its well-defined causes:

1. Reliance on nature. By all means rely on her, but do not forget that you and your tools and your remedies are also part of nature. The reliance on the power of nature in contradistinction to the effort of man's doing, is one of the axioms due to a trinity of modesty, ignorance and laziness. *Natura sanat, medicus curat* is on everybody's lips, medical man's and layman's, the latter's mainly when in health he snubs and ridicules the doctor, while he sends for him in hot haste when falling sick. What the doctor is credited with, perhaps, is that he takes care of the patient, and sees to it that nature may perform its work.

Before a Philadelphia audience, some years ago, the same subject was discussed; a few notes of what was there submitted may be admitted here. Here is an example: "Nature was kind enough to so reduce hemoglobin as to

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give you an opportunity to render a girl a service by feeding her on iron. Nature saves her by kindly giving her a stomach and viscera and lymph apparatus to digest your iron; that is why it is not you that has anything to do with her recovery. Oh, no. But then, there are other cases of chlorosis where nature supinely furnished congenitally small arteries and an *incurable* chlorosis. Most complacently nature looks on; man, however—that is you—is blamed for not making progress against impossibilities. You think you heal a man poisoned by plasmodia by giving him quinin, arsenic or ergot; again a mistake, for it is nature that raises cinchona trees and furnishes digestion; maybe quite often for that reason nature is credited with the good result, and the patient feels justified in not paying the doctor either thanks or debts. You think you save a man by cutting down on an appendicitis or a liver abscess. Far from it; you are only the scavenger, but nature forms exudations and adhesions. You keep skin and table and tools aseptic, and think you did a praiseworthy thing in the way of prevention. What of it? Nature permitted man to invent soap and sublimate and created a healthy cell proliferation. You find a man in the gutter with a sunstroke, kindly donated by maternal nature; you work over him for hours with ice and stimulants and friction; no thanks to you, it is “nature” that empties his cerebral blood-vessels, eliminates toxins and restores him. You are expected to and believe you heal a fracture; that is what you cannot do, nature does it. Can you make new cells? Can you form callus? What you can accomplish is to adapt the ends of the bones and to appear as defendant in a suit for malpractice.” You say all this is farcical? So it is, but the absurdity is not mine. If there be anything insipid in man’s so-called reasoning, it is this unmeaning fighting about words, this wiseacre talk about the relations of “nature” and doctor.

Nature does not kill and does not cure. If there were consciousness in her she would feel indifferent about what she is, viz., mere evolution. With her sunshine she grows harvests and sunstrokes; her moonshine favors lovers and burglars alike; her rain feeds men and drowns them; her

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wind fertilizes trees and destroys the abodes of a thousand people. Nature is a Mauser bullet; stand in its way and it hits you, dodge and you are saved. It makes no difference to nature. In nature a diphtheria bacillus has its democratic rights and duties like George Washington, that is why it could kill him. She has no predilections and no reasoning, she is simply cause and effect. That is why she can be guided and misguided by you, by engineers; and why the logical mind or the whim of man and the logical necessities of nature are engaged in a constant strife for superiority. In matters of health and life the medical *homo sapiens* utilizes or combats the doings of nature. By caring he cures.

Unfortunately, or fortunately, curing—"curare"—has long lost its literal meaning. Curing is healing.

2. The practitioner has no clear indications, and resorts to expectant treatment, which is merely no treatment, but an idle looking on, because of his insufficient diagnosis and prognosis.

Ignorance makes cowards. The nature of a disease is learned, besides its symptomatology, by its pathologic anatomy, in the same way that physiology must be founded on gross and histologic anatomy.

Unless the practitioner is a good diagnostician and observer—for no accurate prognosis is possible without a large number of close observations of the full course of morbid processes—he will never be a good and reliable therapist.

If a man be ignorant and careful and keeps his hands off, he will never do wilful harm to his patient and will let him get well or die undisturbed. But not knowing why and how, he will never benefit him.

Unfortunately for us, most ignorant men are not modest nor cautious; unfortunately also, most of our work is brain work; those without brains, therefore, should not be amongst us. That is why neither our calculations nor our results can be satisfactory always. Those of us who work with hands and brains equally, or with hands preferably, that is, the operative surgeons, are better off. Their aim is simple, their disease local, their treatment direct, even

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their diagnosis is confirmed or refuted by their autopsy on the living, and their medicine simple and effective. Iron in their hands is a different weapon from that on which we read tracts and books innumerable without being sure that we understand its action.

3. The physician is not sure of the action of his medicines; not even specifics, such as quinin, salicylic acid, antisyphilitics, and antitoxins are absolutely certain in their effects. Even emetics and purgatives act differently in different persons; so do narcotics in the mentally sound, particularly, however, in those unsound. Cardiac tonics and stimulants exhibit the same difficulties; their doses cannot be determined by ages or by body weights; the young require very much greater relative doses. Likewise, in the hands of the very best observers, large numbers of cases and observations are required for trustworthy results, and the published records of observers of unequal acumen or experience are far from being reliable guides in different seasons, localities, or climates. Not infrequently the difficulties are increased by the condition of the drugs; digitalis, pomegranate, ergot, pilocarpus, are of unequal value in different countries, and are changed by age or manipulation. Tinctures and solid extracts of many herbs change their nature and activity. Adulterations are frequent. That is why the raw material and many preparations of many herbs are unreliable. Even simple bodies like milk-sugar are adulterated, and are far from serving the purposes they are used for.

Thus it is explained why the tendency of employing alkaloids is growing from year to year. Moreover, the immense increase and the restless activity of wholesale manufacturers—while they deserve credit for much meritorious work, mainly for their synthetic preparations—has greatly hampered the success of the legitimate druggists whose fair dealings are endangered both by the overcrowding of their profession and the competition of the wholesale druggists.

It is wonderful to behold how many are our opportunities to commit sins or crimes of either commission or expectant omission without getting into the clutches of the

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law. The latter, indeed, is lenient; in many cases where it should punish neglect, it pleads in our favor our ignorance, which, indeed, is no "bliss," at least, not to the sick, but a valid excuse for the sinner.

Let me give you a few instances only, of expectant treatment of my own. I want to prove the undefined nature of the boundary line of what may be taken for justifiable delay, but is irresolute ignorance, or cowardice.

It was forty years ago—I kept the notes of the case—that a young man complained to me of pain and swelling in his right side above the liver. He was treated expectantly, in the hope that if an abscess would form it would point externally. Nothing was done. One day the abscess broke into the pleural cavity. My patient died, but his case is one of those that, after nearly half a century, turns up in an occasional sleepless night.

It is not the only one of its kind; nor shall I ever be less disturbed by another piece of expectant treatment.

Forty-six years ago I was at least as young, ignorant, irresolute and helpless as to-day. There was a woman—I know her face to-day, for I have seen it a thousand times since—who died in her first confinement, so did her child, because I killed time and opportunities by bothering with the forceps while I should have saved two lives by Cæsarean section.

Having laid myself open to your criticism, I am egoistic enough now to speak of the expectant mistakes you are making, or many of you, or a very few of you.

What someone here present may be doing constantly is as follows:

A snoring mouth-breather is treated expectantly—that is, not at all. No regular nasal irrigations are made that most normal infants and children should be subjected to—indeed, it is of more importance to wash the dirty little nose inside than outside. Big adenoids are not removed, large tonsils are not resected.

What you by your "expectant treatment" cause and are responsible for is, at least, insufficient aëration, pallor, defective development of the chest, and chronic indiges-

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tion with its life-long results, as also the constant danger of coccus or bacillus invasions. Microbes may be counted by the millions and rendered harmless when merely deposited on the mucous membranes of either nose or pharynx, as long as the epithelia are in a healthy condition; but the undisturbed presence of catarrh, adenoids or chronic pharyngitis, which invite or facilitate microbic invasion, is a direct *causa proxima* for tuberculosis, diphtheria, rheumatism and meningitis.

Suppose you saw a child in a clean, healthy house and family, with slight pharyngitis, perhaps only on one side. You know that when a pharyngitis is found on one side exclusively that can be the result only, either of a local infection or a trauma. You know that, the parents and children do not. Still the child appears to be well with little or no rise of temperature. The doctor is apt to say that he hopes it is nothing, and as that fully agrees with the hopes of the mother, the latter authority thinks well of the doctor because he is of her own so-called thinking. Twelve or twenty-four hours later he is told that there are white spots in the throat, and soon he knows that he has lost the same number of hours. Though the case may not be one of bacillus diphtheria, which you cannot learn until six or ten more hours have passed by, but of the coccus variety, the latter, though benevolently neglected by our conservative boards of health, are infectious and contagious and quite often the source of great danger.

Instead of giving an otherwise innocent dose of $\frac{1}{2}$ or 1 milligram of corrosive sublimate in a teaspoonful of water every hour or half hour, and preventing the full development of the microbic intoxication, you prefer to make no diagnosis, to approve of a mother's prognosis and to show your respect to nature by Micawberish indifference called expectant treatment.

In every attack of diphtheria apparently mild or severe, you have to expect or to fear heart failure—the result of toxins causing parenchymatous degeneration of the muscle; you know it may come, aye, it will come. You treat the baby as if that would never happen. Every death that will occur, unless you have given ample doses, large doses,

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of an alcoholic beverage—first equality—no fusel oil whiskey, which is a depressing poison, should be laid at your door and attributed to your “expectant treatment.”

Why do your cases of pneumonia prove fatal? Some of them—a few only—perish from the paralyzing influence of the infection, many of the accompanying or complicating nephritis, most from heart failure. If the latter be controllable, the responsibility is ours. We know a lobar pneumonia will seldom terminate its exudative period in a few days, usually in six or seven; the duration of a lobular pneumonia cannot be calculated or estimated, and though it does not kill the first day or two, its mortality is greater.

In both we know that from day to day inanition must grow, the heart become feebler, failure be more imminent, and death more sure. Expectant treatment waits until these symptoms, which you are sure are preparing, really come along. When your enemy is inside you try to close the door behind him and begin your race with death when it is too late. Then, when there is no longer a circulation, you hope in vain for the absorption of your stimulants, either in the stomach or the rectum or the subcutaneous tissue—strychnia, ether, camphor, hot injections, whiskey—in vain.

The post-mortem verdicts may vary—I know of what I speak. “The doctors did everything they could.” “When they saw the baby was dying they stood by us to the last.” “We called a consultant, who knew no more than the rest, for, indeed, the darling died almost as soon as he came.”

The facts of the case are these: That many a case of pneumonia dies in spite of your best directed efforts, but many more of your expectancy. You have no right to expect your case to proceed differently from or better than others. From day to day the heart must and will lose strength; *when* this persistent loss will terminate, you do not know; it is your duty to prevent what, without your interference, will certainly happen. Begin your stimulation, which at first should not be alcoholic, coupled with judicious feeding and care of the digestion, at an early

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period of the illness, and do not forget one—shall I say *the?*—principal object in view.

Listen, if you please. To have died is no calamity to the dead; mourning for the dead may be an easy matter to many; to many, however, that remain behind, it is a canker that grows in their hearts forever. Still, the greatest calamity of all is long invalidism; much of this may be avoided by attending to the heart at once. Those of us who for the last fifteen or twenty years, have followed the studies connected with the myocardium, are aware of the many dangers, shortening or embittering existence, that are wrought by pathologic changes of the heart muscle, formerly not noticed or not appreciated.

Permit me to quote a few lines from a former paper¹: “Should medication begin when collapse is setting in, or has occurred? This systematic procrastination is parallel to giving nourishment when inanition is complete, and not before. When the donkey of the gospel disappears in a ditch on Sunday, make haste to pull him out on Monday. Allow the child to drown in your well, and be sure to cover it up—the well, I mean—on the day of the funeral. Build earthworks quickly when the enemy is in your camp. That is the same theory and practice according to which antitoxin is injected on the fifth day instead of the first, alcohol is refused in sepsis, digitalis in full doses in dilation and weakening of the heart, ice and opium in peritonitis, morphine in alcoholic delirium, or venesection in acute overdilatation of the right ventricle.”

Extend your consistency in a mistaken course of acting, or, rather, abstaining from action, and you are no longer within the domain of art based on science, but approach the dangerous border line of the Christian Science criminality.

To those measures which are required to cover vital indications, I do not even allude. I do not choose to suppose that the attempts at saving life in accidents could ever be omitted. To that class, like the cutting of the rope around the neck of a suspended person, belong tracheotomy, or intubation in cases of suffocation from internal

¹ *Philadelphia Medical Journal*, December 17, 1898.

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causes; artificial respiration by mechanical means and electrization of the phrenic nerve, transfusions, and salt-water infusions, also the administration of antidotes to poisons, also the subcutaneous dosing with stimulants.

Next in order are operations which should be understood and practised by every practitioner: besides tracheotomy and intubation, paracentesis in all cases of pleural, abdominal, cerebrospinal and intradural effusions; herniotomy and operations for the relief of immediate dangers occasioned by osteomyelitis and neoplasms. In all of such cases the indication may be so urgent that the question is no longer one of the treatment of a disease, but the immediate saving of an endangered life.

There are other indications almost equally urgent. Prevent chronicity and sequels of a disease by timely interference, and by shortening its course. Though whooping-cough is a self-limited disease, it should be mitigated or cut short, for every day of its duration brings with it the possibility of hemorrhage, broncho-pneumonia, and possibly of tuberculosis.

Avoid amyloid degeneration by attending to abscesses and necroses; the relapses of malarial fevers by giving quinin after the disappearance of the attacks, for a month or two in lengthening intervals. Wherever rheumatic polyarthritis has once existed, with or without endocarditis, see to it that your patient may never be without doses of salicylates on hand, which are to be taken as soon as the slightest pain will have reappeared. By resorting to such measures you will have ample reason to rejoice over many cardiac diseases avoided and deaths averted. Take advantage of the quiescence of the appendix and save the person's life by means of an operation, the time for which you can select, and the prognosis of which, when thus performed, is almost certain to be of the best; instead of standing expectantly by and looking forward to an acute attack that will take him off, operation or no operation.

I am aware that I have not given you anything new, no new clue to diagnosis, no new microbe, no new drug. But I thought I might lay before the young men amongst you some of the lessons a long life taught me and im-

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pressed upon me. During these fifty years there were few days in which I was not called upon either to cure or to prevent, the performance of which duties is frequently invisible and as unpretentious as it may be made useful.

These lessons are not exclusively my own. They were conveyed by and compared with what I could learn from old and young. In my contact with the former I learned what to do and not to do; the latter have often impressed me with their enthusiasm and incited mutual criticism. As I was ever of the opinion that I had a right to claim as much youth and ignorance as they cheerfully displayed, I was always ready to be taught and corrected, and could afford to do so because I need not give up the direction given my life by the compass controlling modern medicine. The impetus which gave medicine its biologic character dates from the time of my first medical studies. That character appeared at first to lead our path away from the goal of all medicine, viz., the prevention and cure of disease, and improvement of the mental and physical condition of man and of mankind; but soon proved the correctness of Benjamin Franklin's saying that no science was good for anything unless it proved beneficent to mankind.

In that sense every progress in the science of medicine contributed to the art of healing and aided in helping to create the era of therapy in which we now live.

To benefit a few amongst you whose professional career may not yet have attained or firmly planted its aim or ideal, I wrote these few pages both as a review and as a platform.

That platform should be:

In order to obtain indications for treatment, make a diagnosis. That art is becoming both more accessible and, through honest and hard work, more easy with the aid of modern methods.

Remember that most diseases have, indeed, a tendency to spontaneous recovery, but also that recovery is not always complete and that invalidism should not be invited through neglect of treatment.

Complications are possible as long as an illness lasts,

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and with every day cut short, the dangers of an otherwise typical disease are diminished.

The experience of old men in the profession who claim they employ less drugs with advancing years, means sometimes either an inability to master new methods of diagnosis, or the knowledge of new medicines or physical remedies.

There is no one treatment for a disease adapted to every patient. There is no such thing as a uniform treatment for pneumonia, or for typhoid fever, or, even in spite of antitoxins, for diphtheria or tetanus.

We should not try to treat the name of an illness, but the patient.

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UNDER ordinary normal circumstances nature is not accurate in her doses. She is not thoughtful, not even circumspect. Her gifts are either plentiful or niggardly without choice or premeditation. She kills and cures without fore- or after-thought. She allows deviations beyond the calculations of mathematicians or chemists and beyond the understanding of those who are gladly led to believe they can do better than she. An immense literature has been created by good men and those who wish to become so, or be believed so, to demonstrate that the methods of nature must be improved upon by ironclad rules of percentage feeding. Nothing is better thought out than percentage feeding, and in its logical persistence more fallacious, unnecessary or injurious.

For the first requisite for the realization of an exact percentage infant feeding must be the equality and uniformity of the material which is to be replaced and that which is to be its substitute. There is no such equality and uniformity. Neither cow's milk nor woman's milk are always alike. The former is dependent on the differences of individuals, herds, races, dry or pasture feeding, the admixture of odorous vegetables, the condition and amount of water in the soil, etc. Still, in every case, and in every condition, the milk is called, and is, good and pure. Only staleness, exposure, and the negligence or crime of man make it a positively dangerous food. Woman's milk varies still more. A baby may thrive at the breast of one woman, but not of another—an observation thousands of years old (Soranus). The albumin of woman's milk was found to range from 0.9 to 1.3 p. c., fat from 2.7 to 4.6 p. c., sugar from 5.9 to 7.55 p. c. This is only one great quotation out of many that could be given you. All of them prove that the constituents of woman's milk, as

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Monti expresses it, are "more or less constant," that means inconstant.

As it is with woman, so it is with the cow. If one woman's milk may utterly disagree with a baby that will do well at another breast, so what I taught fifty years ago becomes intelligible, viz., that the mixed milk of a herd is safer than that of an individual cow may turn out to be.

Even within the boundaries of normal conditions, of the thousands of analyses of cow's and woman's milk very few yield identical results. Moreover, modifications of breast milk occur from minute to minute during nursing, and from morning to night, also on account of changes of food, the amount of food both solid and fluid, and the state of health; also during menstruation, lactation, diseases or emotions. While the constituent doses, both organic and inorganic, thus undergo constantly changes, they are all, or act as, good breast milks, and the babies thrive. Thus the baby enjoys besides proper constituents a series of normal changes. If there were no changes, though ever so slight, the baby would or might lose his appetite and his health, as you do when confined to the same identical diet, as prisoners do, or the inmates of boarding schools, hotels or hash boarding houses.

The ill results of percentage feeding, as it is too often carried out, with its sempiternal and conscientious sameness, are probably due in part, besides other causes to be discussed later, to the persistent uniformity of the constituents of the meals. Infantile scurvy is probably in part due to this tedious uniformity of laboratories and proprietary food factories, and not only to overdone pasteurization and sterilization. Even from this point of view, besides many more, I prefer honest home preparations to those of the manufacturers and their hired employees. These facts have dawned upon many who at one time saw the salvation of babies in nothing but close percentage feeding. Babies will often be benefited when their doctors are cured—of their mistakes. The infant stomach is an organ endowed with physiological freedom, not a test-tube with chemical inalterable rules. Even my old pupils—L. Emmet Holt, who is now my successor in the College of Physi-

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cians and Surgeons, and William F. Park, the famous apostles of close percentage feeding—say now that, “although desirable in difficult cases, it is not necessary in order to obtain excellent results in the great majority of infants, and a certain adjustment of a healthy infant to its food is usually soon secured.” Even the brilliant creator of percentage feeding, my close friend, Rotch, of Harvard, looks upon its variability as one of its principal advantages.

INTERVALS IN THE FEEDING OF THE NEWBORN

If the total daily dose of food for a newborn is to be about 50, 100, 200, 300 or gradually 400 ccm., and that of an infant of a few months about a thousand, how long is the interval to be between feedings? The newborn, they say, is to have a meal every two hours; every new text-book copies that rule from the previous ones. They say two hours, and why not two and a half or three? During the night a longer interval is expected anyway and sometimes enforced. Twenty-five and thirty years ago I emptied a great many stomachs of newborn and very young babies. Invariably I found in them a fair remnant of the previous meal, and made a period of two and one-half or even three hours the rule for the first two, four or six weeks of life. Afterwards the babies will take one or two more ounces each time and retain it. The spontaneous vomiting after meals, easy and hardly unpleasant, provided that the nearly vertical stomach and the meal are normal, occurs in babies of two and four months that have been too greedy or take too much, and in short intervals, and fill up too rapidly from large milk ducts or nipple holes. Most cases can be remedied by interrupting from time to time for a period of a few minutes the nursing or feeding process. The smallness of the stomach of the newborn furnishes no objection to an increased amount of breast milk when administered only every two and one-half or three hours, for during the very process of nursing a part of the ingesta is at once absorbed; indeed, water, when it contains sugar or salt, is absorbed very rapidly. The stomach is more than a mere receptacle. That is why we cannot rely on the accuracy of the statements of the

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books which pretend to measure the size of an infant's stomach by comparing its shape before and after feeding, or weighing the food given at one time: Altogether, we feed too much and too often, both in health and disease. Consider for a moment the indications in cholera infantum.

When I want to save cholera infantum babies—and, like yourself, I want to—I am in the habit of remembering what I practiced and taught fifty years ago, viz., that the only salvation lies in starving half a day and giving nothing for another half a day except farinaceous water frequently in small quantities, and then beginning with milk mixtures which contain only 10 per cent. of it; or, with raw egg (albumin) mixtures, which are acknowledged not to add to intestinal putrefaction and intoxication. In cases of moderate severity, skimmed milk—skimmed by centrifuging—will be preferable to milk, even in those small doses.

Here I have to admit grave derelictions on my part. These simple things I practiced and taught for half a century. Occasionally I have repeated that teaching in pamphlets and books, even during the times that bacteria and mathematical formulæ took possession of men's brains, and every college boy bending over a microscope knew it all. Twenty years ago bacteria began to rule nosology, like Britannia the waves; every fever was the result of bacteria; every diseased body had to be fed, fed, fed, in order to overcome the protracted feverish devastations due to bacteria. To rest the bowels, to allow the products of putrefaction to be eliminated, to starve a short time for that purpose and then feed on non-putrefying material, viz., water and farinacea and egg albumin, was not considered at all; it was not scientific, not learned—it was only empirical, practitioner's hobby. What I sometimes blame myself for is not to have said the same things once a year; but, then, it requires a great deal of altruistic self-abnegation to lay the same egg fifty times and cackle over it just as many times.

What are the doses of food to be given in a case of cholera infantum after you have refused food a number of hours? Teaspoon doses, one every five or ten, fifteen or

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twenty minutes. Then the babies will retain; no full meals will do good; they will be vomited, and vomiting and struggling will exhaust the baby.

DOSES OF FAT

Fat (cream) is added to cow's milk, diluted or whole, for two alleged reasons—first, to increase the nutritiousness of milk, and, second, to render its casein more digestible. I shall give you my reasons for knowing that this practice is incorrect and that babies thrive better on very much less fat, and that the top-milk gospel, though it be inadvertently taught by Graham Lusk, is rather a heresy and detrimental teaching.

The stools of many a healthy infant fed on either mother's or cow's milk contain undigested fat. Part of it is evidently superfluous. Thus, there is no reason why the natural percentage should be raised. Most analyses credit woman's milk with only one-tenth of 1 per cent. more fat than cow's milk. There is no reason in this for an increase, least so during the warm weather. Formula 2 of the Nathan Strauss laboratory, which has fed tens of thousands of babies, contains water 90.11, fat 2.19, cane sugar 5.56, ash 0.39, proteids 1.75. This is meant for babies from four to eight months old. The first of four formulæ supplied in Chicago to very young infants contains fat 1.5, milk sugar 5 and proteids 0.5. Similar low doses of fat I have given these fifty years in private, dispensary and hospital practice and have seen the little ones thrive without interruptions and with very few diarrhœal disorders indeed—not any more than a doubtful milk supply and domestic imprudence and the heat of an occasional torrid week would explain; nor have I seen any "fat diarrhœa."

There are chemical and physical differences between the two milk fats. Woman's milk fat contains more olein and holds from two to four times as many fat globules in its finer emulsion. Besides, woman's and cow's milk furnish their individual enzymes, which differ in every variety of animal.

Asses' milk has always been recognized as a refuge in

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digestive disorders, when neither mother's nor cow's milk was tolerated. Its percentage of fat is low, while its proteid is high compared with that which is contained in woman's milk. Buttermilk, the food of Holland's peasant babies since immemorial times and enthusiastically welcomed by numbers of conscientious authorities of Europe, both for the healthy and for those with enteric disorders, and mixed with only a small quantity of an undextrinized (farina or rice) cereal, and some cane sugar and table salt, contains fat only from one-half to one per cent. and albumin from 2.5 to 2.7 per cent.

Finally, a surplus of indigestible fat is undergoing decomposition in the intestinal tract. Fatty acids, acetone, diacetic acid, are surely the result of the splitting up of decomposing fat, with all its consequences for the intestines and the kidneys, and, secondary, auto-intoxication. That is clinical experience, to be verified in the small laboratory of every practitioner, and need not wait for the result of hypotheses and suggestions which fill the learned and indecisive contents of the ponderous acidosis papers which are crowding into our magazines. What you may verify any time, however, is this—that your very sick babies and children digest no fat, or little fat. Even the fat of woman's milk is not easily digested under the circumstances. Salge reports his experience in such cases—I do not know how many. The sick baby would thrive on woman's milk when it was centrifuged.

DOSES OF SUGAR

Which is the dose of milk sugar that should be added to an artificial meal? There is in woman's milk 6 or 7 per cent. of milk sugar, in cow's milk 3 or 4. A quart of mother's milk contains two ounces—60 ccm.—of milk sugar; a baby of six months weighing fifteen pounds cannot absorb of sugar more than 1-125th of its body weight—that is, two ounces. Indeed, some of it is frequently found in the fæces. Now, imagine you feed a baby on cow's milk mixture, say, of 50 per cent.; then you have only $1\frac{1}{2}$ or 2 per cent. of its milk sugar in the mixture. Now, which is the dose of milk sugar to be added to the baby's

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food? According to the school girl's arithmetic, 4 per cent. more, in order to make it 6 or 7 per cent., which is the amount contained in human milk. According to the physiology of the infant, however—which should be considered sometimes in contradistinction to the professional pediatric journal contributor—none at all. Why?

The casein of milk is kept in solution by the calcium phosphate contained in the serum. This calcium phosphate is decomposed by an excess of lactic acid, the result of milk sugar metabolism, and the casein, no longer held in solution, is thrown out as a more or less indigestible and irritating curd. Cow's milk has three or four times as much casein as woman's milk, and only one-half as much milk sugar. As in both the casein is kept in solution by calcium phosphate, this difference in the percentages of casein and of sugar proves the biological and chemical dissimilarity of the two caseins, that of the cow and of the woman. Thus it follows that if you add to infant food the principal part of which is casein, milk sugar, you cause by its change into lactic acid, though not all of it is changed at once, the disintegration of cow's milk and render its digestion more difficult. Indeed, it has long been known that it is the lactic acid which jointly with the rennet of the stomach and the acids formed out of the fat of the milk causes its curdling. I am no longer alone in my claims that cane sugar should be added to infant foods in place of milk sugar. You need not be afraid, I shall not bother you or myself with quoting what is nowadays called pediatric literature and has made me often decline to meddle with discussions. But you will like to listen at least to Escherich. He says he often finds occasion to avoid milk sugar; he has learned that peptones, which are formed of milk while in the intestines previous to normal absorption, are destroyed by acid fermentation, and concludes that for that reason another carbo-hydrate (starchy food or cane sugar) should take the place of milk sugar. Let me also refer to Finkelstein, who counts amongst the most painstaking modern pediatricists; he told us a year ago that the acute disturbances caused by butter-milk feeding resulted from accidental decomposition and

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bacteric disintegration. Now, however, he admits he was in error and the digestive troubles were caused by the large percentage of milk sugar in the buttermilk mixture.

In the treatment of infants with intestinal disorders Finkelstein has come to the conclusion that an improper amount of sugar leads to grave intestinal intoxication. "Infant foods" exhibit this detrimental tendency in proportion to their percentage of soluble carbo-hydrates.

TABLE SALT

Both cow's milk and cereals contain slightly more potassium than sodium. Either require NaCl as an addition to the food both of the sick and the well. Part of it is absorbed, part broken up into another sodium salt and hydrochloric acid. Thus it excites the action of the glands convalescence when both the secretion and the muscular and facilitates digestion. Therefore, in diseases with defective secretion of gastric juice, or in the beginning of power of the stomach are insufficient and the necessity of resorting to nitrogen food—mainly in the cases of older children—appears urgent, an ample supply of salt should be prescribed. Elimination takes place rapidly through the urine, saliva, the tears and perspiration. As the latter is very copious in many cases of rhachitis, this demands a good supply of table salt, besides a careful exodus of foods which, like leguminosa, cabbages and mainly potatoes, contain much potassium. If any excess of acid formed out of sodium chlorid gets into the intestinal canal, it combines readily with the sodium of the bile and assists in providing a second combination of sodium chlorid, which is absorbed lower down in the tract. In the circulation and in the cell life (by taking up alexins?) it enhances the vital processes by accelerating tissue changes and eliminating more urea and carbon dioxid. Sodium chlorid prevents the too solid coagulation of milk by either rennet or gastric juice. Cow's milk, therefore, with its firm casein coagulability, should never be given without table salt, and woman's milk whenever it exhibits the same tendencies should be treated alike by adding a solution of sodium chlorid to every meal. A dose of from one to one and one-

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half grammes daily will suffice for a baby of a month or two.

Habitual constipation in many forms is influenced beneficially by salt, partly for the reason given before, partly for its osmotic increase of secretion in the intestinal tract.

WATER

Much of what we should learn from mere observation in the well had first to be learned by medical practitioners in the treatment of the sick. Diarrhœal diseases taught them the rational uses of starchy foods; atrophy and diarrhœa in the very baby that of water. The tissues of the newborn contain 10 per cent. more water than those of advanced years. Immediately after birth the lungs, kidneys and skin, also the intestines, remove large quantities of water. Ten or twelve per cent. of the weight of the newborn were lost within a week—that was the rule—and the doctor and midwife looked complacently at the shrivelling mite while its blood thickened inside. If there be, as usually, no milk in the mother's breast, the baby should at least have water; if she have, it is colostrum, which contains 3 or 5 per cent. of nitrogenous substance—that is, more than five times as much as her milk will have after some weeks. That disproportion is still more unfavorable when the baby is premature. That is why colostrum must be diluted to suffice both as to quantity and dilution, if for no other reason than to preserve the equilibrium of the tissue-mixtures and the weight of the body.

Things are still worse in artificial feeding. Cow's casein is chemically and physically different from woman's casein and three or four times as plentiful in proportion. Without ample dilution cow's milk is food, such as it is, but no drink. Many of our babies cry because they are thirsty, not hungry. If what they are given the first day or two is not pure water, the food should be diluted with water five or six times its quantity. Later on dilution of milk should be 1:3 the first month, 1:2 later, 1:1 at six months. They threaten you, if you follow that method, with dilatation of the stomach. There is no such thing. In the form in which it is in the stomach of the baby, with sugar or salt, or both,

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added to it, water is rapidly absorbed. In your own case drinking water may cause micturition in a minute or two; in your diabetic patients who drink five or fifteen quarts of water a day you never met with a dilated stomach caused by the ingestion of water.

Moreover, water ingested in ample quantities dilutes and washes out uric acid infarctions and thus prevents the formation of renal calculi, which are not uncommon in the young, pyelitis, which is not infrequent, and nephritis, which is very common. The amount of water to be given cannot be told with accuracy. The baby will tell you when he has had enough. For us it is merely duty to offer as much as he will take frequently and not to forget that whatever water is ample in health is much below needs in feverish diseases.

The external use of water in the shape of cold, cool or warm bathing or applications in health and disease, in summer or winter, in the newborn, the infant, the child of a few or more advanced years, cannot be considered here for lack of time. As early as 1872 the *Medical Record* published a few lectures of mine on antiphlogistics, in which I laid down the rules substantially as recognized at present. The very young, the feeble, with incompetent circulation and reaction, do not bear cold bathing or cold applications. Persistent cold to the head in the meningitis of very small infants with thin skulls is not tolerated, nor should cold applications to the chest in pneumonia be persisted in unless the heat of the body warms them within a reasonable time. A cool or cold bath from which the baby rises with cold feet that cannot be warmed without difficulty raises instead of lowering the internal heat. That is why a warm bath from 6 to 12 degrees lower than the body heat will not only be tolerated or enjoyed a long time—ten or twenty minutes or more—but will reduce a fever temperature with or without adjuvant medication. Otherwise cold applications or bathing, mainly with friction, will stimulate the cutaneous and thereby the general circulation, the lungs and kidneys, and will raise—as has been demonstrated experimentally—hæmoglobin and the number of blood cells. To nobody more than to Kellogg and

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Baruch is the profession of America under obligations for persistently hammering into our ears and consciousness the fact that in an intelligent use of water—not of cold water only—our hygiene and therapeutics have been greatly improved and fertilized. Hydrotherapy has at last been recognized as an important factor, not to be endorsed as an additional embellishment only of rational treatment, by the foundation of a special chair for hydrotherapy by Columbia University to be occupied by Simon Baruch.¹

DOSES OF STARCH AND CEREAL FLOUR AND GELATIN FEEDING

Which is the dose of starchy food the newborn baby or the infant is to be given, if at all? My friend, Woods Hutchinson, who has lately settled in New York to arouse it from its acknowledged or alleged profound slumber, is of the opinion that cereals have “some value as a food, but little to compare with its capacity as a stirrer-up of acid fermentations and intestinal putrefaction,” and that “the secret of the wonderful success of the Scotch lies in the fact that any nation trained to survive a diet of oatmeal and the shorter catechism could survive anything and flourish anywhere” (*McClure's* April, 1906). He is simply mistaken. The Scotch fed themselves and their babies on cereals containing a little starch, the Dutch on buttermilk without and with a little starch, and, as happens frequently, theory limped behind experience, and the instinct of the people preceded the alleged or genuine explanation of its century-old doings.

I learned the use of cereal admixtures to milk from my old friend, Van Swieten, who died only lately, and have practiced and prescribed them these more than fifty years. Thirty years ago Schiffer proved the transformation of starch into sugar within ten, even five, minutes in the mouths of babies, one of whom was two hours, one sixteen days and one two months old. Similar experiments to prove the diastatic action of the salivary glands of the

¹ An appreciative article on “The Treatment of Fever Cases in the Public Service,” has been published lately by C. A. Drew in the *Boston Medical and Surgical Journal* of August 8, 1907.

newborn can easily be and often have been repeated. So the small percentage of starch in cereals is rather an advantage than otherwise. Thus when it can be shown that the casein of cow's milk requires the addition of something for the purpose of dilution and suspension, if for no other reason, a cereal addition should be given, and I give it, besides other reasons, in place of water. Such has been my teaching since 1860. I have been ably followed about 1900 by Chapin and by White, who are quoted by Graham Lusk. Its rapid passage through the mouth does not hinder the influence of the saliva in the stomach, and, though the pancreas requires the first few weeks of life for the completion of its amylolytic function, small doses of starch are converted, for it is rarely found in the fæces of a healthy baby. This digestibility is still enhanced by the greater relative length of the gut of the baby, by the greater number of absorbent villi of the mucous membrane and by the greater number and larger size of the lymph vessels all over the infant system.

Starch in general renders albumin feeding in part unnecessary; the latter contributes less to the formation of muscle than is done by carbo-hydrates; besides, carbo-hydrates act as an anti-fermentative in the gut, contrary to Woods Hutchinson in *McClure's*, while albuminates, with the occasional exception of egg albumin, are apt to cause intestinal putrefaction. You remember, in connection with this fact, that even in diabetes Von Noorden recommends the use of oatmeal for the secondary oxidation of B-oxy-butyric acid, in addition to very large doses of alkalis. Starchy foods prevent diarrhoea. Even Keller, the prophet of malt soup feeding, recommends the addition to it of undextrinized wheat flour. Famous men have convinced themselves that diseased intestinal conditions do require the feeding of flours; gradually many of them substitute flour decoctions for mere water in their practice, and, what is more conclusive, some of these already in their public teaching and lay sermons.

Again, which dose? They have told you they have discovered, what every old woman knows, that exclusive flour feeding swells the babies' bellies and glands, shrinks their

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skins and legs and feeds the undertakers. Even now they write articles on that threadbare old story.

I advise and practice one-half tablespoonful of barley (or, when there is a tendency to constipation, oatmeal), slowly boiled in a quart of water down to a pint; add a little salt. Of this, for the newborn, five parts to one part of boiled cow's milk (provided you feed artificially from the beginning). After a month, perhaps four parts; after two months, three parts; after three months, two parts; at six months, one part. This is the average rule, to be modified by individual experience, necessity and common sense. Use flour of the whole barley; if it be not in the market, grind pearl barley in the coffee grinder. The whiter the barley flour of the market, the larger is its percentage of starch, and it is but a low percentage of starch that is wanted.

The October (1906) meeting of the Pediatric Society of Munich was mostly taken up by a discussion on flours and cereal decoctions as administered in the artificial feeding of young infants. Ten fellows participated in it. Oppenheimer compared the results of an excessive flour feeding for babies less than four months old and those of exclusive cow's milk feeding, reported the old story of sickness, emaciation and a high mortality under the influence of flour feeding, claimed that the women of the poor class could not be taught discrimination and for that reason advised a declaration on the part of the society in favor of exclusive milk feeding, which in the present condition of the milk supply of the city meant milk and water. He added, however, that the admixture of diluted amylaceous decoctions were not injurious and regretted the great diversity of rules given by writers who, while being very positive in their recommendations, failed to justify them by relating their results. Seitz confirmed the prevalence of exclusive flour feeding in Munich. Ibrahim explains the more favorable results of plain milk feeding by the manifest detriment following exclusive flour feeding. Pfaundler expresses himself as follows: If he had to choose between exclusive flour feeding and exclusive milk feeding, he prefers the latter, but if a baby was to take

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cow's milk to the same amount as it is given woman's milk, the former would prove detrimental on account of its intrinsic difference. If less is given, nutrition is insufficient. Dilution requires a supplement. The amount of sugar demanded for that purpose—amounting to 1 per cent. of the body weight—is injurious. The drawbacks of exclusive milk feeding render cereal decoctions indispensable. He does not understand the nature of the salubrious effect of the carbo-hydrates, but it is certain that the retention of nitrogen depends on their administration. Rommel doubts the occurrence of an uninterruptedly good result during any artificial feeding—gives flours, ten to fifteen grammes daily to nurslings, according to the recommendations of Finkelstein. He quotes Rubner, who fed an abundance of albuminous diet to contest the desirability of undiluted cow's milk. Moro knows of no injury resulting from amylaceous decoctions, but protests against the feeding without any milk in acute disease for a period of twenty-four hours. Hecker refers to the presence during the first weeks of a baby of a saccharifying ferment, which should be taken as a hint furnished by nature herself. Adam asserts that he requires carbo-hydrates for both healthy and sick infants, unless fat be indicated. Trump admits his change of mind compared with his former teachings proclaimed on many public occasions. He now believes that undiluted cow's milk overcrowds the infant organism with albumin and that carbo-hydrates are not only important in the intermediate metabolism, but are a useful admixture to infant food by their mechanical effect. Thus the tide is turning gradually in the direction of my lifelong teaching.

In the last number of the *American Journal of Physiology*, issued August 1, 1907, Dr. John R. Murlin finds experimentally that the power of the organism to utilize *gelatin* as a substitute for proteid in maintaining nitrogen equilibrium depends to some extent on the proteid condition of the body. When this is low, gelatin contributes much to protecting the living substance of the body.

Donders in 1853, Voit and Bischoff (1872), were aware of the nutritive elements of gelatin.

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Dr. Murlin summarizes as follows (p. 289) the results of the researches on gelatin: "Gelatin can replace proteid only in part (Voit, Oerum, Pollitzer); it has, however, a high proteid-sparing effect, whether fed alone (Kirchmann, Krummacher) or with other foods (Voit, Oerum, T. Munk, Kauffmann, Rona and Müller), in infant-feeding or in convalescence (Brat, Mancini). This proteid-saving effect is exerted also by gelatin-peptones (Ganz, Gerlach and gelatoses, Brat)." Dr. Murlin's historical review is not quite complete. I recommended the use of gelatin for purposes similar to those mentioned in connection with cereals in 1876 and in 1882 in the first volume of Gerhardt's Handbuch. There older literature may be found, for instance, Guérard quotes De Léry, who promised to feed an army locked up in a besieged fortress with gelatin procured from skins, old shoes, saddles, etc., and Derris Papin offered Charles II. of France in a book ("The Method of Softening Bones," Paris, 1682) to feed the inmates of poorhouses and hospitals with gelatin. My conclusions were and are that if it were necessary, the dilution of heated cow's milk with gelatin decoction is more digestible than cow's milk alone.

DOSES OF MEDICINE

Opium.—We are told by the books that doses of drugs must vary according to ages. That is true, but they must also vary according to body weight, digestion, constitution and urgency. Moreover, there are cases of idiosyncrasy. Once I sat up all night with a gigantic man to whom I had given œdema of the throat and larynx with a single dose of five grains of iodide of potassium. On the other hand, a little baby will bear two drachms of it daily in meningitis. But do not get frightened by what the books say merely because they say so. Maybe you are very innocent and do not know—though many of you are authors—how books and magazines and papers are liable to be made, evolved and copied. Besides, when a mistake has been made a thousand times we call it experience, and when it has been printed a thousand times and copied and read, it is called scientific truth. For instance, you have read

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everywhere that *opium* is a dreadful thing to give to an infant; have been taught that the dose of a drug to be given to a baby of half a year or a year must be one-twentieth or one-fifteenth of that of an adult person—or very much less if the drug be an opiate. The Yale graduating class whom I told so a few years ago nodded their assent. Now, I have been in New York practice fifty-four years and have treated many thousands of babies with enteritis of different forms. You know that unless a severe diarrhœa is soon stopped the baby may die of exhaustion or of hydrencephaloid, so I stop it as soon as possible. I give one-thirtieth or one-fortieth of a grain of opium (Dover's powder, one-third or one-fourth) every two hours, with chalk or bismuth, subcarbonate or subgallate—never the gritty, hard subnitrate. I have never seen a case of opium poisoning of my own making. Nor will it happen to you if you watch the first dose or the fifth or have it watched. But if you are guided by the books I warn you to watch the adult. If you give him fifteen or twenty times the dose of the baby, that amounts to half a grain or three-quarters of a grain every two hours. I learned long ago that adults—unless you wish to sit up with them while they sleep—want watching after those doses. Please remember, however, I did not speak of the other aspects of the treatment of enteritis—there is more of it—but of opium only.

Belladonna.—Babies a year old with whooping-cough take extract of belladonna, gr. 1-10 or 1-12, three times a day, or six, eight or ten drops of the tincture three times a day; within a week it has to be doubled to insure a result. The book dose corresponding with his age would be from one and one-half to two grains three times a day for the adult. I know, however, that adults, when given a single grain day after day, will exhibit the symptoms of an overdose. That is why I say watch the poor adult. Children with enuresis will take an evening dose of extract of belladonna, half a grain, more or less. If they exhibit in their first sleep a flushed cheek, then you hit the correct dose; if not, increase the dose, provided you want to have an effect. Adults will take one grain only and have a dry

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throat in the morning. Here is one of the numerous therapeutical facts which prove that the infant is not merely a miniature of the adult and that the general practitioner requires special and extensive study before he becomes a pediatricist.

Calomel.—A syphilitic baby of one or two months takes one-eighth, one-sixth or one-fourth grain for many weeks, even months, in succession. The only thing to happen to him is to get well. Give the schedule dose—fifteen to twenty times as much—to an adult; what will happen to him is salivation and not a tooth left; what will happen to you is a suit for malpractice—meanwhile the dentist has a job. Our great Benjamin Rush believed—in the diseases of the adult mainly—very strongly in calomel. Calomel was to him the “Samson of medicines.” He did not remember that Samson slew three thousand with one effort.

Corrosive Sublimate.—What is the dose of corrosive sublimate you give an adult when you want him and yourself to be safe? Say one-fourth grain a day. To a baby with diphtheria, particularly the laryngeal form, give one one-hundredth or one-sixtieth grain in half a tablespoonful of distilled or boiled water every hour, for a number of hours every half hour, and you are doing something by which you contribute to his recovery. You may continue that for three or four days, and no salivation will ensue; there is no vomiting, no diarrhœa. A dilution of corrosive sublimate in 7,000 or 10,000 parts of water is readily borne. What little looseness of the bowels may appear—rarely, though—is easily controlled by a few drops of camphorated tincture of opium. When I speak of this with so much confidence, please remember that the ample records of these facts, which I published as early as 1884, have been confirmed by the experience of twenty-three more years of myself and of many friends and pupils. Since 1858 I have been steeped in diphtheria.

What I intend to accomplish with these doses is two-fold—first, the constitutional effect; second, the local action. I need not go into particulars to prove that local disinfection requires frequent applications, and that doses must be given very often.

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Tincture of Chlorid of Iron.—The same remark is valid with regard to another remedy with which my name has often been connected, viz., the tincture of chlorid of iron. It is still popular with many in exudative affections of the throat. In connection with potassic or sodic chlorate—and, later on, sometimes with corrosive sublimate—I recommended it in doses of one or five or more drops, properly diluted and prepared, every hour, sometimes p. r. n. every half or quarter hour. Here also I wanted both the constitutional and the local effect. It became the source of great humiliation to me some twenty-five years ago. It was when a famous Englishman, starred in our country, after having published a book on diphtheria in the same year (1880) when my treatise came out. In a public address, wishing to compliment me in my humble presence, he said I had greatly benefited the profession and the people by recommending a few drops of tincture of iron chlorid to be given a few times daily.

Potassium Chlorate.—In connection with the chlorid of iron I may refer to potassium or sodium chlorate—the more so as I was the first to prove the fatality of large doses of it when it became a popular remedy and was recommended, for instance, by Seeligmütter, of Halle, in detrimental doses. In stomatitis, particularly of the ulcerous form and that which precedes and complicates diphtheria, a baby of a year may take daily from twelve to fifteen grains; an adult never more than one and one-half drachms, if it is to be continued for a week or more. Its effect is mostly local; even when taken internally and after having exerted its local effect while passing the mouth it is in part eliminated through the salivary glands and re-enters the mouth, while more passes through the kidneys. But what is the method of administration? The total daily amount should be given in intervals of an hour or half an hour or twenty or fifteen minutes; always avoid combinations with sulphur or phenol or iodides or acids. A drachm in a pint of water furnishes 128 teaspoonful doses of one-half grain each, one of which may be given every half hour to a baby under a year.

Alcohol.—In a book entitled “Alcohol and the Human

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Body," Sir Victor Horsley and Dr. Mary D. Sturge bring an indictment against alcohol. They reason as follows: All life rests upon a cell basis, and alcohol narcotizes and irritates the cell protoplasm of the lower forms of animal and vegetable life, like the upper, and depresses the nerve, muscle, liver, heart, and, in fact, all tissues and the mental as well as the physical faculties. It does not fulfill the functions of a food, though it be oxidized in the body. The heat produced by oxidation is counterbalanced by that which is lost through the skin. Alcohol, according to Romeyn, does not diminish, it increases the elimination of nitrogen, thus failing to prevent tissue waste. That is what they claim.

It strikes you, however, that even in this book of Horsley's there is a tendency to prove too much. For if the warmth produced by alcohol is lost, and if nitrogen is eliminated in an increased ratio, it merely means improved metabolism. They also quote Frederic Treves, who reports as follows: "In the relief column of 30,000 which moved on Ladysmith the first who dropped out were not the tall men or the short men or the big men or the little men—they were the drinkers, and they dropped out as clearly as if they had been labeled with a big letter on their backs." It is exactly the big letter on their backs to which I direct your attention. I have known before, and so have you, that drunkards lose their efficiency, in the army or out. But even when observation will or would prove to you the efficacy of alcohol for bad only, the experiments or observations are made on the healthy, not on the sick. Observations on the sick, particularly those suffering from infectious diseases, are good observations also. If the effect of alcohol can be proven to differ in the healthy and in the sick, we may admit we are without any explanation thus far. It is not the first instance of a clear fact being attended with an incompetent theory. The cases in which the theory could not keep pace with clinical observations are very numerous in the history of therapeutics. Besides, the number of drugs which when given in small doses or in large doses exhibit the very opposite effect is very great indeed. Think of opium, ipecac, calomel. Alcohol be-

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longs to that class. It must always be given diluted to protect the digestion. That it acts as a stimulant and increases the pulse and respiration and arterial pressure—diminishes, however, the temperature of the body and the elimination of the urea and carbon dioxid—is well known; also that it has anti-fermentative and antiseptic properties in erysipelas, furunculosis, phlegmons, etc. Much of the action of aromatic tinctures and spirits belongs to their alcohol. But I still find that for internal medication insufficiency and pusillanimity have the floor. It must yet be learned that almost no dose of brandy or whisky is too large in bad cases of sepsis. What I said on the subject in 1874 was the result of a continued diphtheria experience of sixteen years. I have taught it since and written it in 1903, and shall repeat it in any future edition of my book. Whoever is not afraid to give daily in the very bad cases of diphtheria-sepsis six ounces of whisky to a child of four or five when two ounces fail, or ten or twelve ounces when six fail, will soon convince himself of its power for good, slurs, like those of Kassowitz, who stoops to garbling quotations from my writings, notwithstanding. I repeat, brandy and whisky must be diluted. Wine, which, moreover, is too often adulterated to be relied upon, is no equivalent unless the stimulant effect is the main or only object.

One more word: These large doses of diluted alcohol, comparatively or apparently large, are the proper ones for the very worst cases of mixed infections of very bad forms of diphtheria which are not reached by antitoxin—no matter in what doses or strength the latter be used. They are the very cases that have tempted doctors who mean to cure their sick to raise their doses of antitoxin from five to fifty thousand units. You know the cases. I wish many of you have never seen and never will see these distressing objects of pity or despair. Please do not forget how much good may be done by alcohol—big doses and many, well diluted, oral, subcutaneous, rectal. But they are not those that may be left to the exclusive care of a distracted mother or to the majority of paid nurses.

Laboratory results are not always successful or conclusive, and should be studied with what little or much

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discrimination practitioners like myself and perhaps some of you are credited with. My friend Abbott is both an ingenious and brilliant and a practical man, head of the Health Department of Philadelphia, professor in the University of Pennsylvania and a first-class laboratory experimenter of acknowledged standing. Dogs, guinea-pigs, pigeons, rabbits, mice, chickens, besides students and doctors, are his daily companions. He finds that a five ccm.—75 minims—dose of absolute alcohol is a fatal dose to a kilogram—two pounds—of body weight. The amount is given in one or two doses, undiluted, through a stomach tube, directly into the stomach of an animal which has previously been subjected to a sudden infection.

Now a human being is not infected suddenly with the full final amount of virus; while the infecting virus is increasing and working in the cells and the circulation, it also causes the production of an antitoxin, and the full dose of the alcohol is not given at once, and not undiluted. That is why Abbott's gastric erosions are not found in the dead patients. Moreover, when Abbott objects to a proportionate dose of absolute alcohol in man, he is correct, for five ccm. of absolute alcohol to one kilogram body weight means 375 ccm.—nearly a pint—to a man weighing 150 pounds, or more than four ounces of absolute alcohol in one dose undiluted to a four-year-old child of fifty pounds. Such experiments as his need not be made or are not applicable; they find no comparison in practice.

The Nestor of alcohol experimenters is Binz; for more than forty years he has tried alcohol on man, not on rabbits. He is only one of many that, contrary to Horsley and the Swiss, who, like Bunge, because their country is being ruined by drunkards and travelers, condemn alcohol indiscriminately,—is convinced of the antiseptic and antifebrile action of alcoholic medication.

There is one thing we practitioners should beware of—that is to be carried away by our modesty. The life of a practitioner on account of its difficulties, dangers and failures, teaches self-reliance; but in the moral and conscientious man it inculcates modesty besides. That is why we are liable to accept the actual or alleged results of a laboratory

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experiment as tantamount or superior to our own clinical observation; though the latter be repeated a thousand times and not found wanting.

HEART STIMULANTS

Digitalis.—Heart stimulants are tolerated and required by infants and children in very much larger relative doses than by adults. It appears that medication is required rather in proportion to the functional power of the organ; just observe a boy of two or three years and the endurance that little or rather relatively large heart exhibits all day during play. The book doses of $\frac{1}{2}$ or 1 drop of tincture of digitalis have no effect but to protect you against the reproach of overdosing. Actually, they are absolutely useless; you may give them for weeks and see no action in anything like an urgent case. If in a case of pneumonia you want its effect you do not require it after the funeral, you want it within a day. Give to a baby of one or two years 5 or 6 drops of a good tincture of digitalis every two hours; even then you will have to wait a day for a satisfactory result. If during a pneumonia fever in an adult, or in a child, there be cyanosis with dilatation of the right heart which becomes percussible far beyond the right edge of the sternum—cases in which venesection is apt to prove life saving mainly in the adult—give a big dose at once and repeat it after a few hours, once or twice. A big dose I should call for a baby of a year 15 or 25 drops. Do not be afraid. I have been in the practice of my profession in New York 54 years, and my respect for human life, and my fear of doing harm has been growing with my gray hairs. The least objectionable of my public address has been that which was delivered in Rome, July, 1894, on the subject: *non nocere*.

A girl of 12 or 13 in the service of Dr. Walter B. James had meningitis with septic symptoms,—pulse 160 and over, cyanosis. She took a teaspoonful of tincture of digitalis, and half a teaspoonful a few hours afterward. Instead of imminent death there was a temporary recovery. It is true she died, but not until three weeks afterward, for substantial reasons.

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Almost every case of pneumonia occurring during a number of years in the Jacobi ward of Roosevelt Hospital, when the pulse rose to a dangerous frequency, has been treated with the tincture of digitalis,—such as is prepared in the hospital,—in full doses. Children of from one to five or six years have been treated with doses of from 2 to 5 or 6 drops, or more, every two hours. A frequency of 140, 160, or 180, required those doses at all events for a day, sometimes more, with the result that it dropped from twenty to forty beats. Sometimes more time was required. In few cases only there was a slight irregularity, never any vomiting. When the proper effect was reached, the drug was either discontinued or administered in longer intervals. There was a baby of little more than a year with pneumonia and a weak heart, with 170 beats a minute. She was given 6 drops of our Roosevelt tincture every two hours. That was continued for two days until the pulse came slowly down to 104. It became fuller and remained regular; no vomiting; appetite improved. She took twenty doses in two days, altogether about one drachm. After that time, without medication, her pulse rate was regular, fairly full, 112.

I have only a single remark to add—be sure to obtain a reliable preparation of digitalis. The best herb is certain to spoil in a short time on the shelves and in the tightly-closed glass jars of even the best drug stores. It begins to do so, according to Kobert, one of the greatest living authorities, within three months.

A brief remark on the cumulative effect of digitalis should be permitted. I have seen it often, mainly in my younger years. When the pulse becomes irregular without another cause for this arrhythmia, or when vomiting occurs, it is time to stop, or to diminish the dose, or to lengthen the intervals between doses. This cumulation, however, should not be abhorred to the extent as some writers do, or pretend to do.

The above doses cannot be continued longer than an acute disease requires it. Then you stop.

But there is an indication for relatively small doses continued over a long time in chronic mitral incompetency, in

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chronic conditions of weakness of the heart, either of muscular or of nervous origin, or of insufficient circulation caused by pulmonary obstruction, such as we meet in chronic bronchopneumonia or in tubercular infiltration. Small doses of digitalis, that is, from 4 to 6 grains (0.25—0.4) daily, or its equivalent, may be given to *adults* through weeks, months, and years, without any hesitation. Such doses may be ordered while the patient is not expected to be seen again for weeks or months. Indeed, there is hardly a day when I am not obliged to prescribe them for patients who I know will not reappear for a month or more. In most cases I prescribe for adults either 4 drops or more daily of Squibb's, or any other good fluid extract, or the solid extract—usually one-half grain three times a day, almost always in pills, rarely by itself, often in combination with spartein, or strychnin, or arsenic, or other drugs, as the case may be. Such combinations are obviously observed to be useful, as nosologically they are required by the fact that the *heart is not a uniform body*, but a compound of muscular, connective vascular, and cerebro-spinal and sympathetic nerve tissues. We have but rarely to deal with an affection of only one of them, and the theoretical demand of only one remedy in a prescription looks well on a platform as the ornamental trimming of an impressive address to the young, but gives you a poor show at the bedside. Patients who take digitalis in these small doses do not show a cumulative effect, nor are they getting accustomed to it to such an extent as to lose the benefit of its action. Indeed, like the body, which demands a few daily meals year in year out, the heart in chronic ailments requires a daily stimulation and daily doses. There is nothing astonishing in this; analogies we meet with everywhere. Mercury is given for months and more in succession; iodides are administered persistently and indefinitely, not only in syphilis but also in the cardiac ailments of atheromatous old age where digitalis is rarely tolerated, and in asthmatic conditions; arsenic is taken for years, uninterruptedly or almost so, in large or in steadily increasing doses in psoriasis, lymphomatosis and sarcomatosis, even in chorea. Possibly an

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arsenic compound, atoxyl, which appears to be effective in "sleeping sickness," may be thus given for a long time, as I suggested to our Michigan colleagues at Detroit lately, and with advantage in the cases of local or general lymphorrhœa caused by filaria. Phosphorus, if it is to break up a bad case of rhachitis, demands a course of from six to ten weeks; thyroid, thymus, or suprarenal glands, also hypophysis, are demanded for months, or years, or life, to accomplish the end in view.

All this looks so simple, and it is so simple. This method of which I spoke as the result of a long experience of mine, before the Medical Society of the State of New York in 1884, has been practiced by me these thirty or forty years. That is why I was surprised by the several discussions of the same method on the floor of the German Congress of Internal Medicine since 1899. Its introducer was Grödel, of Naulheim—by the way, a man far superior to the average practitioner of European Spas. That my name should not have been mentioned in connection with it, is explained by its being American, and not of merely yesterday. Personally, I have always been guided by the principle attributed by Frederick Scott Oliver to Alexander Hamilton, viz., that it is of prime importance a thing should be done, no matter whose name is linked with it.

I repeat: In chronic valvular disease; in chronic interstitial or lobular pneumonia; in congenital debility of the heart muscle and that muscular incompetency of the heart muscle which is caused by or complicated with chronic tuberculosis; in chlorosis or other forms of anæmia resulting in malnutrition of the heart—digitalis in doses equivalent to three, four, five,—not more than six, grains (0.2—0.4 daily), in adult cases, may be administered for weeks or months, or more, with no cumulative action but with a steadying and strengthening effect.

Doses in infancy and childhood are as I say comparatively large. No baby should take less than the equivalent of one grain daily, for an indefinite period. If you mean to prescribe for three or six months with no possibility of seeing your patient, you may wish to feel perfectly easy; then give to a baby of one or two years 3 to 6 drops of

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the tincture of *digitalis* three times a day for one week, and the same dose of tincture of *strophanthus* in alternating weeks; or mix the two tinctures and give three times a day, 2-4 drops aa.

Digalen has been introduced by Cloetta. Whether in its amorphous condition it is identical with digitoxin is not decided. The liquid, introduced with triumphant ardor, has made many friends like everything else that is new. On the other hand, I have the reports of some reliable hospital clinicians, friends of mine, with ample means of observing, who deny its efficacy in so many cases that I am not in a position to vouchsafe it nor to advise doses appropriate in the diseases of the young, or of the old. I am more positive in regard to digitalin, with which I became acquainted fifty years ago. It is a glucosid, not an alkaloid. The digitalins sold by different firms differ widely. In practice digitalin is unreliable and useless.

SPARTEIN

Sparteïn sulphate has been a plaything of American doctors. Apothecaries are still calling up my office to inform me that they have been told that one-quarter grain (0.015) is the maximum dose. I credit Nothnagel with having taught me in one of his writings that he likes to give 7 grains (0.5) a day. To an adult I never give less than 2-4 grains daily, for many weeks and months, without interruption. No baby should ever have less than a grain a day in divided doses, provided you expect an effect. Unless you expect an effect, give no drugs.

CAMPHOR

Camphor is not yet appreciated amongst us sufficiently. It is a valuable cardiac and general stimulant, both internally and subcutaneously. A baby of one year will take 1-10 grain (equivalent with a minim of spirits of camphor, or 15 minims of aqua camphorae), up to 1-4 grain every hour or two hours. Diluted mucilage covers the taste fairly well. Subcutaneously, it should not be given in alcohol or in ether, on account of the serious pain caused by these solutions; the official camphorated oil (1:10) is too bulky

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and thick, and contains less camphor than a solution in sweet almond oil (1:4). Even this passes the needle better under pressure than by mere aspiration. In cases of collapse or utter weakness it is of great value in doses, to a baby of two years, of 6 to 10 drops, once, or repeated according to circumstances. My emergency satchel is never without it. The monobromate of camphor has no stimulant effect; its effect is more that of a bromid of potassium or sodium.

CAFFEIN

Nor is my emergency satchel ever without a saturated solution of sodio-caffein salicylate (or benzoate), 1:2. Its effect is rapid, elimination takes place steadily—thus cumulation is out of the question. A baby of two years will take as a heart-stimulant, in fainting conditions, cardiac weakness, pneumonia, anæmia,—not, however, in brain hyperæmia—half a grain or a grain of this double salt (corresponding with half the quantity of caffein) every two or three hours. In pulmonary œdema with suppressed heart-function the subcutaneous injection of 4, or 6, or 10 minims may be repeated, when demanded, every quarter or half, or whole hour. I have employed it constantly and recommended it in lectures and in print these twenty-four years, since Rossbach introduced it in the third German Congress of Internal Medicine, 1883. Caffein must be avoided in cerebral irritation.

There are a few general suggestions only in connection with the hypodermic treatment of the young. The arms and legs must be avoided in them still more than in the adult. Koch recommended the injection of tuberculin between the shoulders; so did others, for other purposes, like medical men who do not remember—physicians do—that a patient wants his own back to rest on. There is indeed a vast difference between a medical man and a physician. Irritating substances must be injected in greater dilutions than in the adult. Lewin recommended a one per cent., or nearly one per cent., dilution of mercurial bichloride in syphilis; for infants, the solution should not be more than 1 in 500.

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STRYCHNIN

On strychnin, I published a paper in the "International Clinics" of 1902. If the drug were never given as a cardiac stimulant it would do less harm by omission than it does now by commission. Young colleagues tell you at the sick bed, as a matter of course they have given strychnin, and expect your approval,—mostly in vain. Still, while it is much abused, it has its good indications as a vaso-motor stimulant of the pneumogastric which controls the heart and the circulation of the abdomen under the control of the splanchnic nerve. When this latter is cut or paralyzed the numberless and dilatable vessels of all the viscera are expanded to the utmost and collapse results from the empty condition of the heart and aorta. Then, if you have time, give strychnin internally, but in urgent cases, subcutaneously, at least once or twice; dose 1-20 or 1-12 of a grain, once or twice. If there be twitching, twitching of a live baby is preferable to the undisturbed peace of a dead one. Your next internal dose may be made smaller. Not long ago I saw a boy of three years who suffered that way in consequence of a fall upon his chest and belly. He took two big doses under the skin and 1-100 grain every two hours internally for a day. Acute myocarditis, endo- or pericarditis contraindicates strychnin, nor are there many cases of chronic myocarditis that may be benefited by it. On the contrary, I have published a few, and seen many, cases of galop rhythm and arrhythmia that were invariably injured by it, while improved by opiates given in small or moderate doses three or four times a day.

Doses must vary, for the action of the drug evidently depends on the amount and the condition of the circulating blood, not to speak of the nature or urgency of the individual case.

Welcker explains the resistance of fish to the action of curare by their smaller amount of blood; it is from 1-53 to 1-93 of their body weight, while the proportion in the dog is from 1-12 to 1-18, in adult men 1-13, in the child 1-19. It appears, therefore, that in fish the poison arrives at the periphery of the nerves more slowly than in

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the mammal. In accordance with this observation is that of Delaunay (*Comptes Rendus de l'Acad. des Sciences*, Vol. 93, p. 452), who found that when a frog was poisoned by strychnin after a depletion, its action was less marked than in a frog not so depleted. Of two frogs, that one which was better nourished was more sensitive to the action of a poison than that which was emaciated by starving, and the right half of the body—which in frogs is more developed than the left—is more readily poisoned than the latter.

It would consequently appear that ill-fed, or emaciated or slowly convalescent, or septic patients, or those in whom the nerves,—for instance, in infectious fevers,—have undergone organic deterioration, require larger doses of strychnin (also of other poisons, such as quinin, atropin, or nicotin) than the normal organism. To this endangered class belong the newly born, the infants, and the children, on account of several causes. In the newly born there is a peculiar indolence of the nervous system. As we first learned from Soltmann, the reflex actions of the newly born are very defective. In connection with that physiological fact, we are told by Lewin (*Die Nebenwirk. d. Arzn.*, 3 ed., 1899, p. 6), that larger doses of strychnin are required to exhibit a spastic effect in the newborn than later. For instance, for a kilogram body-weight of the newly born animal 0.415 milligrams of strychnin nitrate; when it is $2\frac{1}{2}$ days old, 0.347; when $7\frac{1}{2}$ days old, 0.218; when 10 days old, only 0.210 milligram to 1 kilogram body-weight is required. In the infant and child the influential factors are the small amount of blood and the frequency of septic infections. High degrees of anæmia require comparatively large doses of strychnin, and the sepsis of typhoid fever, diphtheria, scarlatina, demands unusual doses both internally and subcutaneously. A girl of 11 years took 1-3 of a grain of nitrate of strychnin subcutaneously, daily, for some days; 1-10 grain is no rare daily dose for thoroughly septic babies one or two years old. I know whereof I speak; but I also know that mishaps have been recorded. Most of the fatal terminations occurred in cardiac cases, a fact which should be remembered by those who cannot

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treat a heart disease without strychnin. Even in diphtheria a few have happened, *not, however, during its septic stage*, but when the drug was used in the consecutive paralysis. In hyperæmia of the brain it should be avoided, either because the organ is over-sensitive in that condition, or because inhibition has been paralyzed by it.

After all, however, it is well to look for averages. A baby of a year may readily take 1-3 milligram = 1-180, or 1-200 grain four times a day; a boy of five, 1-2 milligram = 1-120 grain, provided the treatment need not be continued a long time, and without interruption. Whenever strychnin is to be given a long time, as a tonic, a somewhat smaller dose will suffice. Almost exclusively, I prescribe from the pharmacopœia or the National Formulary; the elixir of pepsin, bismuth and strychnin of the latter contains gr. 1-100 of strychnin in a teaspoonful; give 1-2 a teaspoonful four times a day to a boy of five years, for an indefinite period, and take no proprietary imitations, which contain too much strychnin.

Strychnin has lost its credit in chronic paralysis. I never saw a success in poliomyelitis when it was given internally; the disease requires patience, extending over years. A child of three years, with the remnants of this so-called infantile paralysis, can be slowly improved, however, by adding to other treatment, electricity, galvanism, massage, etc.,—the injection into one of the paralyzed muscles once every day or every other day, of strychnin sulphate or strychnin nitrate 1-30 grain or more.

Now, let me close this symposium of fragments with a single remark made by an Ohio man whom I knew well, Robert Bartholow. In an oration delivered, 1876, before the Medical and Surgical Faculty of Maryland, he said: "He who despises his art can never become a great artist. Good practitioners are always found to be men entertaining the greatest confidence in the powers of medicines." But you must study these powers and learn how to employ them.

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THE etiology of fever may be ever so obscure, or disputable, still there are a number of facts common to all its varieties. There is in every form of fever *some* degree of hyperthermy; both the heart beats and the pulse are accelerated, blood pressure is mostly low, and the number of respirations is increased. Consumption both of ingesta and of tissues (amongst which the volumes of the heart and of the brain are the last to be influenced either by fever or by inanition) is increased more in fever, however, than in mere inanition. For while the absorption of oxygen increases in fever by only twenty per cent., the elimination of carbonic acid grows by from fifty to eighty per cent. Such is the case though it be cold water that depressed the temperature; but much more so in warm surroundings than in cooler ones. That shows how detrimental must have been the method of keeping fever patients warm.

The coloring substance of the urine which originates in the blood is increased twenty fold, the elimination of potassium seven or eight fold, that of sodium, however, is diminished, so that in pneumonia for instance there is almost none in the urine. Albuminoid disintegration is vastly increased, thus more nitrogen is eliminated. Urea, the daily amount of which in the normal man is thirty grammes, during starvation ten, during copious introduction of nitrogenous food sixty grammes, is eliminated while the food supply is scanty, in quantities changing from forty to eighty grammes daily, not only during the height of, but before and after the fever. Kreatinin and uric acid also are largely increased. Albumosuria is common both in infectious and in aseptic fevers, and is likely to be a common—perhaps universal—symptom which indicates danger. For albumoses seem to be the final results of al-

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buminoids decomposed in the muscles and the liver by the fever generating substances that circulate in the blood. When they are rapidly eliminated through the kidneys, the danger is not great; when not, they paralyse or poison the nervous system and interfere with the innervation of the blood vessels and the elimination of the body heat.

The vascular ganglia in the blood vessel walls are under the influence of the vascular centres of the spinal cord, these under that of the main vaso-motor centre of the medulla oblongata, and this again is controlled by the temperature centre in the cerebral hemisphere which at the same time regulates the intensity of metabolism. It is here that a puncture, or a trauma, or a tumor, or a local disease may rouse sudden or protracted temperatures. Whether there is, in addition to the centre that makes temperatures rise, another one that inhibits, remains to be seen. The assumption of its existence appears to be unnecessary.

Increased temperatures and increased metabolism are not, however, identical. For the latter when both production and elimination are equally increased may grow with normal temperature.

And there are surely fevers which result from diminished elimination during normal production of heat. The dangers of such condition depend upon the degree of vitality in the organs or the organism. Toxic fevers, for instance, while they increase metabolism, injure the power of resistance on the part of the cells.

Most fevers seem to be of microbic origin, but there are many exceptions to this rule.

Specimens of fevers not caused by microbic influences are those which are observed after childbirth when there is no endometritis or parametritis, but only a clot in the uterus; or in the presence of hæmatomata, or during the disintegration and absorption of exudations in protracted pleurisy or pneumonia or in ascites originating in tuberculous peritonitis, or during the absorption of tissue which many operators, and Farquar Curtis (*Medical News*, June 24, 1899) but lately stated to take place for days or weeks even in aseptic wounds though primary union be not

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disturbed (this occurs frequently in strumectomy, less so in operation on the mamma and after herniotomy); or those that follow shock either immediately or after a preceding subnormal temperature; or those that depend on the absorption of urine during nephrectomy, or of bile, or of thyroid secretion; or those which happen during abstinence from water, or after venesections. In both conditions metabolism is increased with the result of furnishing the water which is wanting. Exacerbations of temperature after transfusion are also, in my opinion, the result of rapid decomposition and forced elimination or superfluous or rather unused material. The body temperature is raised during the absence of oxygen; metabolism is excessive and rapid when oxygen is wanting, as for instance in pneumonia, where the artificial supply of oxygen can be made to relieve both metabolism and respiration. The same increase of body temperature takes place during muscular overexertion—the term muscular fever has often been given to this condition. It is easily explained when we consider that even under normal conditions metabolism is induced by disintegrating enzymes first in the circulating, afterwards only in the tissue-albumin, and in the carbohydrates when not quite firmly organized, and that this process takes place mostly during and in consequence of the contraction of the muscles. The inference on general hygiene need not be pointed out; except in this that without muscular exercise there can be no healthy body-economy. Most characteristic for the non-microbic elevation of temperature, however, are the fevers that follow catheterization, or those that attend the passing of gall-stones, or the sudden transition from heat to cold on the cutaneous surface. In all of these cases we have to deal with a reflex irritation of the vasomotor centres and with contraction of the cutaneous blood vessels. In these cases there may be and probably is some increased production of heat, but the main source of the fever should be sought for in the diminution of surface loss. This is normally brought about by conduction through the normal tissues, that is, by radiation, and the evaporation of water. These are stopped when the innumerable sweat follicles cannot

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act and be relieved under the influence of heavy or impermeable clothing or covering, or of excessive atmospheric humidity, and can be restored by the dilatation of cutaneous blood vessels through artificial means. Diaphoretics are here indicated, and are aptly supported by derivants, i. e., diuretics and laxatives. Before our minds were both enlightened and clouded by such bacteriologists as claimed the earth for exclusive microbial etiology, and by their followers who are still nothing unless in the fashion, there were, though with less accurate knowledge it is true, great physicians with good observing powers. They treated such fevers on the above mentioned so-called metasyncritical methods, a name dating from Galen. So do we, though some of us do not admit it. The disadvantage of the method was only in this, that while the difference between non-microbial and microbial fevers was not substantiated, the same method was applied to all of them. Thus it happened that infectious fever cases were smothered under heavy downs, drowned in hot teas, and exhausted by intestinal draining.

The reduction of increased temperatures has been attempted in different ways. A direct action against the source of fever was attempted with very indifferent results, by administering antiseptics; that was when antiseptics and antipyresis were considered identical—an assumption which is not demonstrable as yet. A second method consisted in the use of remedies which were meant to paralyze the organs of circulation; but digitalis, veratrum, etc., require very large, indeed too large doses, to have that immediate effect. The third method, which is more effective, is directed upon the locality of the production of heat, viz., either the cells of the tissues, or upon the heat regulating centres in the brain and medulla. Quinin seems to act on the cells, most of the other antipyretics appear to reduce the temperature of the body by the increase of heat elimination, through hyperæmia and perspiration.

Thus the general indications of anti-febriles are various. They may be given for the purpose of killing or paralyzing microbes, or of annihilating the effect of their toxins; of reducing the action of the temperature centre

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and the increased metabolism, and thereby preventing excessive inanition and exhaustion; and of increasing the surface loss of temperature with the effect not of reducing metabolism but of relieving somnolence and other cerebral dangers, thereby adding to the comfort of the patient, diminishing the period of actual danger, and thus reducing mortality. At the same time the danger of diminishing the alkalescence of the blood is averted and the degeneration of the tissues precluded. The latter end is perhaps best attained by the use of mineral acids.

Can we kill microbes in the blood or the tissues? Perhaps. We may do so by antiseptics given in doses sufficient to kill the patient; if that patient be a child, so much the worse for him. Is it *necessary* to kill them, or is it sufficient to paralyse them? The latter is a possibility since Prodden succeeded in so doing by administering largely diluted carbolic acid.

Whether protracted dosing with bichloride of mercury has some such effect, as I so fondly hoped that I still practice it in many forms of infectious fevers, remains to be seen. The effects of toxins may surely be counteracted by antiseptics in the accessible cavities, the occasional objections of bacteriologists to intestinal disinfection notwithstanding.

Moreover, that diluted antiseptics, even when but temporarily employed, have a beneficial effect, is visibly proved by the effects of wound irrigation. Zimmerman's experiments made under Kocher's direction which proved that, have always been sustained by what every operator knows. Though antiseptic irrigations may irritate a wound and cause secretion, still they cause no suppuration; and the vital energy of the cells is not injured by them; and finally wounds may and will heal though they be not entirely free of microbes.

Of late some soluble silver salts have been proclaimed as the sheet anchor of antiseptics in many forms of septic fevers.

B. Cr  d  's first publication¹ on "Silver and Silver

¹ Compare *Klinisch-Therapeutische Wochenschrift*, 1898, Nos. 14 and 15.

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"Salts an Antiseptics" appeared in 1896. That pamphlet was followed by many journal articles since, also by a paper read by him during the meeting of the Moscow International Medical Congress in 1897. His experience with them extends over many thousand cases and has often been renewed and extolled by observers of all countries. His followers are sometimes more enthusiastic than he is himself, though his own convictions approach sometimes the fervor of fanaticism. Credé first tried the lactate of silver (in the trade called actol), and the citrate of silver (itrol), which are non-poisonous and efficient antiseptics, but require too large dilutions for subcutaneous injections and cannot be employed in strong solutions on account of their forming insoluble combinations with the albumin of the tissues.

So he applied to chemists who produced for him metallic silver in fluid form changing in the body into the antiseptic salts. This "colloidal silver" is almost entirely soluble in water and albuminous fluids, and apparently hinders the development of and destroys certain pathogenic germs, viz., staphylo- and streptococci, to such an extent as to very often effect a rapid and absolutely surprising cure in recent cases, and also in chronic ones, such as slow sepsis and furunculosis, where secondary changes of vital organs, such as abscesses, or gangrene, have not occurred.

The first form of the drug recommended by Credé was an ointment which goes by his name containing fifteen per cent. of metallic silver, three grammes of which are a dose for an adult, one gramme for a child. It takes twenty or thirty minutes to be fairly well rubbed into the skin. In average cases a single inunction, in severe cases several, in chronic cases from five to twenty inunctions were required to cause a decided improvement in the symptoms.

The internal administration of colloidal silver is resorted to mainly where there is a contraindication to inunctions. Credé orders pills of 0.01 with 0.1 of milk sugar, with glycerine and water, two of which are taken two or three times daily. Improvement is said to be immediate. Chronic cases, for instance tuberculosis, require

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one pill twice a day. No argyriasis was observed after many months.

For subcutaneous use a solution in 200 parts of water was employed for fungous and tuberculosis processes in which it is customary to make iodoform glycerin injections. The dose is from one-half to two grammes every week or two. Externally it may be used in a solution of one in 5,000 to 10,000; solutions of one in 2,000 are said to prevent the growth of staphylo- and streptococci in the culture tube.

The internal administration of colloidal silver meets with difficulty when the stomach is acid. In that case the drug is decomposed. This does not occur with egg albumin, which is prepared by bottling the white of an egg with equal parts of glycerin. The prescription is one to four parts of colloidal silver, 200 to 800 parts of distilled water, egg albumin one to four; a tea or a tablespoonful three times daily with a glass of water. Sugar may be added. Rectal and intravenous administration has also been resorted to.

This is the preparation which is claimed to relieve or to cure phlegmon, lymphangiectasis and lymphadenitis, phlegmonous angina, fœtid bronchitis, peritonitis, furunculosis erysipelas, puerperal fever, gonorrhœal and articular rheumatism, tuberculosis, scarlatina, diphtheria, typhoid, gonorrhœa, etc. At all events this is the class of cases in which that soluble and non-injurious antiseptic is expected to be serviceable, and there are many reports that appear to prove the justifiability of its claims, at least to a certain extent. The careful practitioner who has seen many rockets to rise like stars and to descend like sticks, will do well (to judge from what I have seen myself), to try the colloidal silver for what it may be worth. We have all been looking for a soluble antiseptic which would kill cocci and toxins without harming the tissues. In this drug we are promised such a material. We are not bound to accept the dicta of enthusiasts bent upon writing an article that will carry their names through the ephemeral literature of a brief half year. On the other

hand, we need not condemn, like Conrad Brunner and Carl Meyer, who in a big book lately proved to their satisfaction that the claims of Credé were not at all sustained by the facts. That happened this way. Credé expressed the hope that bacilli would be as amenable to the action of his silver preparations, as cocci, and was once led away to say that "all microbes were killed by colloidal silver in five minutes." Our clever authors found that lactate of silver (not the colloidal) one in 1,000 could not kill anthrax in three days, and the citrate did not destroy *staphylococcus aureus* in sixty minutes. They need not have disproved what was not claimed. My own experience is limited to a few cases of phlebitis, puerperal fever, and pyæmia. I am sufficiently impressed by it to make further experiments, not relying on colloidal silver alone, but supporting it with the aid of stimulating and supporting treatment, and that of the knife in appropriate cases.

The temperature centres may certainly be influenced; they may, as I intimated, be paralyzed even by large doses of digitalis and veratrum, and by excessive doses of phenol preparations. But the temperature is not only regulated by the centre, but also in the periphery. The effect of quinine, as I said before, is local in the cells and remains evident even after the section of the spiral cord, while the phenols appear to act both on the centre and on the surface. The latter, which regulates the loss of temperature, exhibits hyperæmia and perspiration. Phenols exert their influence even when the lower part of the cortex is irritated by a puncture, and show a general influence on other cerebral centres, for instance, by promoting analgesia.

There are those who object to the use of antipyretics altogether, on the ground that high temperatures, mainly those of the infectious fevers, are required for the formation of antitoxins, and thus for recovery. There can be no doubt that even the apparently worst cases may get well spontaneously, those of typhoid, for instance, or of cholera or of plague. It is said their high temperatures kill bacilli and form antitoxin. But this killing is an unreliable postulate. While they form toxin, they need not be themselves destroyed. Typhoid bacilli outlive their

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toxin, and their possible antitoxin. And indeed if they succeed in killing bacilli they kill cells also; with the unwelcome tenants the suffering host. If according to that theory they develop antitoxin after a while, that while is often too long for the muscles and nerves and epithelia to endure both the heat and the disintegration. Wait for the beneficent effect of heat in sunstroke and you have a corpse to take care of. If typhoid and plague get well it is not the persistence of high temperatures that saves one-half or less, it is the vitality of the patient which endures and overcomes it all. Indeed the mortality rises with the height and permanence of temperatures. These, however, may be ever so high, provided they are interrupted, they are endurable. Pneumonia and typhoids with fair *remissions* permit of favorable prognoses. While plague with *persistent* temperatures kills fifty or sixty per cent., relapsing fevers of long duration, and with very high temperatures, have a mortality of only two or three per cent. because they have long intermissions.

Continuous hyperthermy does not only, as Marfan says, show the presence of danger as indicated in the condition of the pulse, in the presence of thirst, asthenia, dry mucous membranes, inactive liver, defective excretions, and depressed or excited cerebrum; it is a danger by itself, and should be fought by water, or by chemicals, as the case may be, until the danger line is recrossed backwards in the direction of a euphoric condition of the sensorium, of appetite, of respiration, and circulation and diuresis.

The multiplicity of the causes of fever prove its nature. It is not an entity but a symptom, the treatment of which should not be guided by iron-clad rules. Rises of temperature are not by themselves injurious, on the contrary, there are those which seem to have as suggested before an immunizing effect. At all events a temperature which may be an annoyance or a danger to one individual, is an indifferent matter to another; and a temperature which is badly tolerated on the first day of an illness, may be easily borne later on, and vice versa. It all depends on the patient, not on the thermometer. Besides some causes of fever will prove temporary, others permanent; while for

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instance some of the bacilli are dangerous a certain time only, other microbes, like plasmodia, become the more detrimental the longer they remain undisturbed. Thus in the treatment of many fevers it is their causes that require consideration; in others, however, their relations to, and influence on the body are the main consideration. When the condition of the latter is fair, and no danger is incurred by the fever, it should be left alone; when the rise of temperature, however, by itself is injurious, it should be interfered with. At all events, however, the treatment of the symptom "fever" gives us no hope of shortening the disease in which it occurs or of which it forms a part; on the other hand, it is a satisfaction to know, that while we increase the comfort and diminish the immediate dangers, the natural healing process is not disturbed. In this way both the justification and the limitation of the so-called expectant treatment become evident. To allow a high temperature to deteriorate tissues and exhaust the heart and brain, is as injudicious as is the custom of emphasizing the number of degrees of Fahrenheit as the only valuable part of a morbid process. To be satisfied with depressing temperature is a grave mistake, but to allow pneumonia to run its deleterious course of high temperatures unchecked with their full influence on the rapidity of respiration and the action of the heart and on the increase of waste, is equally injudicious.

In their injurious influence on nutrition protracted fevers act like direct losses or like starvation, or rather more than these. The younger the patient, the greater is the danger from that source. That is why a high temperature without any or trifling remission should not be allowed to last, though its immediate effect may not appear very ominous. When a high temperature results in a convulsion we never hesitate to reduce it; here we admit there is a vital indication. Why, then, not reduce it while there is the danger of a possibility or probability of their occurrence? I dare say, however, that more infants and children die of the slow results of protracted high temperatures during what is called convalescence than there are destroyed by their effects in the onset of the disease. This danger may

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be averted by early attention to very high temperature. Amongst the tissues the blood is injured at an early date.

An acute anæmia is more easily overcome than a chronic one, which undermines the vitality and strength of all the organs while it slowly robs them of their nutrition. To this latter class belong those anæmias which result from such diseases as are attended with sudden losses, high fevers, and starvation. It is mainly infants that when thus stricken recover but slowly or not at all, the less so the younger they are. Young animals resist starvation, which acts similarly to infectious fevers, to a less degree than old ones. A dog two days old bore starvation in Magendie's laboratory two days only; a dog of six years, thirty days. Similar results were obtained on pigeons, by Chossat. Thoroughly anæmic and delicate babies, having become so by a protracted disease and ill-nutrition, rarely recover, entirely, like starving young animals that never obtained this normal condition though they were carefully fed afterwards.

Add to these facts the disposition of the young to inanition which is caused by two main factors. The first is their rapid metabolism, the second and principal one is the relative almost universal insufficiency of the young organism. Without my going into details, its blood is less in quantity compared with the adult. In the former the relation of its weight to the total body weight is 1 : 19.5, in the latter 1 : 13. This blood in the young has less fibrin, less salts, less hæmoglobin (except in the newborn), less soluble albumin, less specific gravity (1.045-1.049 : 1.055 in the adult), and more leucocytes than in later life. All of which suggest the facility with which hydræmia is developed by injurious influences.

Moreover, we should not forget that most of our antipyretics are at the same time nervines, analgesics and diaphoretics, thus improving comfort and metabolism. They are surely indicated when bathing is not sufficiently efficient; in that case they may act as adjuvants, as combinations, and procure sleep and remissions; or when baths are contraindicated, as in most cases of intestinal hemorrhages, in peritonitis, in utter cardiac failure, and when

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the extremities are persistently cold. If I add that there are, however, contraindications to the use of medicinal antipyretics because of possible idiosyncrasies, and of the debilitating effects many of the antipyretic drugs are apt to exhibit, I merely say what all have experienced, and what everybody should remember, viz., that no degree of Fahrenheit, and no Greek name of a morbid process are the subjects of our medication, but an individual patient.

Quinin affects bacteria but little, those of anthrax, for instance, in a solution of 1-625 only. In water solutions of quinin fungi will grow as shown microscopically by their increasing turbidity. Only infusoria and turbellaria are influenced by solution of 1 : 20,000-100,000. It diminishes the metabolism of albuminoids and the amount of uric acid, also the number of circulating leucocytes and their ameboid movements. In normal conditions it reduces the daily oscillations of the body temperature, in abnormal ones the latter is affected quite gradually in accordance with the absorbability of the drug, the elimination of which commences within half an hour, and is finished within twenty-four hours after its administration. In small quantities it accelerates the pulse and increases blood pressure, in larger ones occasionally, even in relatively small doses, it may cause urticaria or other exanthemata or renal irritation with albuminuria or hematuria; it also diminishes, as Piorry showed first more than fifty years ago, the size of the spleen, not, however, through any effect on the central nervous system, for the same effect is obtained when the nerve has been previously cut. Nervous symptoms, such as tinnitus and difficult hearing and impairment of sight, even collapse, and convulsions with affection of the centres of respiration and circulation, are also rather original disorders of circulation than of innervation.

In fair doses it is certainly antipyretic. When now and then in malaria infection a single large dose has been observed to *cause* an attack (sometimes the very first), this should be attributed to the rapid contraction of the spleen, which has the effect of suddenly deluging the circulation with the bloodcells containing plasmodia that were stowed away in the sponge-like tissue. It is the same observation

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I have sometimes made, under the same circumstances, and described in the *Transactions of the Climatological Association* of 1898, when administering ergot in cases of chronic malaria infection without previous chills.

Besides malaria, feverish diseases with a remittent type such as typhoid fever, and pneumonia with a marked morning remission are mostly amenable to the antipyretic action of quinin. If at all it should be given during the remission. In malaria it should be administered during the period of sporulation, that is from three to five hours previous to an attack, but not as Golgi and Koch recommended, in the decline of the paroxysm, when the parasites are large. The sporules are most easily killed, the young ameboid forms of the plasmodia are more obstinate, the crescent (*Sizygia*) varieties, however, should be treated with more frequent doses.

In accordance with his rule, according to Golgi, Marchiafava and Bignami, the tertian malaria fever is readily influenced by the administration of quinin just before the paroxysm in such a way that the following paroxysm is either prevented or delayed. In the quartan type when administered four or five hours before segmentation ("sporulation"), it readily kills the young forms, but not the adult, so that the following paroxysms are not interfered with.

It is desirable to secure prompt absorption which is retarded when there is vomiting, diarrhoea, gastric catarrh or obstinate constipation. Now and then the combination with bitters and tonics acts favorably under such circumstances. It is here perhaps where Beverley Robinson and others have their principal successes with the tincture in preference to the salts of the alkaloid. Absorption is certainly aided by the addition of diluted alcohol, or of spices. That regard should be had to the taste of medicines is self-understood in the cases of infants and children, and not infrequently solubility has to be sacrificed in the interest of taste. In very urgent cases the subcutaneous and intravenous administration yields the best results; then the solutions must be neutral. The carbamide (bimuriate with urea) may be injected into the subcuta-

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neous tissue in warm solution of one to four or five, muriate of quinin three parts, with antipyrin two parts, with enough water to make six parts, is highly spoken of as painless and not liable to cause necrosis. That painlessness I have not been able to confirm. My preference is for the bimuriate with urea.

Ointments containing quinin were recommended by Semanas sixty years ago. Many years afterwards I have often employed them, but gave them up because of the uncertainty of absorption and the impossibility of determining the dose. The oleate of quinin should not be used because of the irritation caused by the oleic acid. If ever the practice of inunction should be revived, the ointment should be compounded with lanolin, and the inunction be made into the moistened skin.

Rectal injections of quinin solutions should not be acid; the bisulphate, muriate, bromide, or the bimuriate with urea, all of which are very soluble, should be employed in that way.

The internal administration of quinin during the height of the fever temperature should be avoided unless there is a case of pernicious fever with no or little remission, if only for the reason that absorption becomes more doubtful with rising temperatures. That is why stomach and bowel medication in all sorts of diseases with high temperatures becomes unreliable and subcutaneous application has to take its place. In regard to the estimation of the temperatures in malaria the diagnosis may moreover become uncertain if we rely on the appearance of a chill, which, if at all met with in the young, does not always correspond with the highest temperature.

In internal medication, while absorbability should first be considered, the question of palatability is important. The greater the solubility, the bitterer is the drug. That is why the muriate, and the bromide which has the advantage of causing cinchonism to a lesser degree, are objectionable in infancy and childhood. Older children may be able to swallow capsules, which, however, are sometimes not dissolved and may be picked out of the stools. The neutral tannate is rather tasteless and in doses of

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150 per cent. larger than those of the sulphate will generally be well taken. Most of us will be best satisfied with administering the sulphate, the taste of which can be covered by syrup of coffee, by chocolate, or the elixir adjuvant, or that of Yerba Santa. It is important to recollect, however, that if quinin sulphate is kept on hand in the elixirs, some of it will dissolve and be repugnant. That is why the powder should be mixed immediately before taking. A number of children fond of chocolate I have seen greedily eating the sulphate when mixed with copious quantities of that material, to the satisfaction of all parties concerned.

When remissions are very short, or when there are almost none, as in the abdominal fevers, or in many cases of the deceptive quotidian fevers of the very young, it is a good plan to reduce the temperature, if only for the purpose of improving the chances of absorption, by adding an occasional dose of antipyrin to the quinin.

The temptation to let up on medication when the fever in malaria has subsided is very great. The result of that mistake is a perpetuation of the illness, and of relapses. To avoid them, and to get rid of patient and fever with a single prescription I always follow a fixed rule. Provided the patient has a tertian fever, he takes his dose—a child of two years, 0.2, an adult, 0.6-1.0 a few hours before the expected attack.

He takes the same dose on the third day, perhaps also one on the fifth, the next on the ninth, or the fifteenth, on the twenty-third. That plan is effective; there is no return of the fever *and* no return of your fee. When the type is quotidian, as commonly in infants, and frequently in children, there must be some little modification of the general plan.

Malaria fevers are amongst those whose origin is known, and which are most accessible to successful treatment by quinin. Still there are acute, but mostly chronic cases, of malaria that are not conquered by it. In such cases I have had good results with ergot these forty years, and communicated my experience to the American Climatological Association in its meeting of 1898. (See *Transac-*

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tions and *Medical News*, October 22, 1898). The results of my observations are laid down in the following conclusions:

1. There are cases of chronic intermittent fevers with large tumefaction of the spleen, that after having resisted the action of quinin, arsenic, methylene blue, eucalyptus, and piperin are benefited by ergot.

2. When enlargement of the spleen is not old and not firmly established the contracting effect of ergot is noticed within a reasonable time.

3. The attacks will disappear before the diminution in the size of the spleen is very marked.

4. Though temperatures after employment of ergot, remain irregular and now and then somewhat elevated, chills, as a rule, are not noticed with this elevation.

5. Plasmodia do not seem to disappear from the blood so rapidly as they do after quinin, when the latter is effective. But even while some are still present, the attacks being more or less under control, the patient will feel better.

6. Complicating local pain requires additional treatment with ice, or cold douches, or heat; chronic hyperplasia demands iodid of potassium or iodid of iron. Digestive disorders may indicate, as they often do, when quinin is expected to act before the employment of ergot, an emetic, or a purgative, or stomachics.

7. An experience extending over forty years in which I have used ergot in many instances, justifies me in asserting at least this much: that there are many cases of chronic malaria, apparently intractable, that will get well with ergot.

8. There are cases, occasionally, in which the return of elevations of temperature after the successful use of ergot makes the combination of ergot and quinin, or ergot and arsenic advisable, though quinin and arsenic had not been successful previously.

9. Ergot, like quinin, probably by its sudden contracting effect on the spleen, and by the forcing of large quantities of plasmodia-laden blood into the circulation, is, in chronic malaria when hydremia and spleen tumor are

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excessive, capable of bringing on the very first attack of chills and fever.

10. Recent cases of malaria have got better, or were improved under the extensive use of ergot, but many resisted a long time; that is why acute cases should rather be treated with quinin.

Salicylic acid is both an irritant and an antiseptic. (Because of this latter property it is employed in medicine and in trade; for the preservation of foods; in excessive perspiration, both as a powder—modified by ninety-seven per cent. of bismuth subnitrate or talcum, or as a two per cent. ointment. It is eliminated through the kidneys either without any change, or as salicyluric acid.) Its physiological effect is that of a sedative, or of a paralyzing agent for the nerve centres of respiration and of the heart; it shows the inhibition of temperature loss and causes peripherous hyperæmia and perspiration. Its effect is certainly different than that of quinin (which acts through a direct effect on cell metabolism) inasmuch as its albuminoid metabolism is larger by twelve per cent. and its elimination of uric acid larger by from thirty to forty-five per cent.

Its irritant quality made the acid objectionable for internal administration. That is why the salicylate of sodium first introduced in 1874 by Kolbe and employed in acute rheumatism in 1875 by Busse has taken its place for an antipyretic first for general purposes, and when here it was superseded in polyarthrititis where it is about as efficient a specific as quinin is in malaria poisoning, both as a preventive and a curative.

What I said of the different mode of action of quinin and of salicylate of sodium explains a fact to which my attention was called at an early time. In many cases of pyæmic fever, in septicopyæmia, or in mixed pulmonary tuberculosis, when either quinin or the salicylate were given singly, proved ineffective, the combination of the two would have a happy effect.

Its use is not limited to internal administration. When used in ointments and applied to rheumatic joints it may appear in the urine within one-half of an hour (like

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methyl salicylate "artificial oil of gaultheria") when one or two teaspoonfuls are applied to a joint; or like salicylate acid one part, made into salve with lanolin one, oil of turpentine one, and fat ten parts.

Antipyrin when employed during normal conditions increases the tension of the pulse and blood pressure—therefore it is contraindicated in hæmoptysis—and produces perspiration. Locally it is slightly antiseptic, moderately anæsthetic and markedly styptic; in the subcutaneous tissue irritating, it acts more on the general central nervous system than on the centre of circulation; that is why it acts—while being antipyretic—as a sedative and analgesic. But it should not be considered as a nervine, for its action appears to be *ushered in* through the mediation of the blood and blood vessels. The peculiar exanthem resembling measles, vesicles about the mouth and genitals, local œdemata in face and larynx, catarrhs and hemorrhages, all of which are seldom encountered after the first dose, the occurrence of local relapses, and occasionally of persistent pigmentation, finally the presence of antipyrin in the contents of the vesicles, seem to prove the presence of alteration in the walls of the blood vessels.

The body temperature begins to decrease within fifteen or twenty minutes after the first dose; to render its antipyretic effect more tangible and persistent, it should be followed by a second within two hours. This rule, however, does not hold good when the drug is given for its sedative or analgesic or for its slight anti-rheumatic effect. The usual occurrence of temperature elevations which are observed, as they also are in exceptional cases of quinin administrations, should be explained by an idiosyncratic paralyzing effect on the temperature centre.

In many feverish diseases of the cranial contents antipyrin appeared to me to be inactive. Whether this experience of mine is universal or whether this inefficiency of the drug is met with in certain cases only, and in which ones, I do not know yet.

The salicylate of antipyrin, called salipyrin, has in twice

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the doses of antipyrin its antipyretic effect, and is frequently better tolerated than antipyrin, particularly by neurotic or neuralgic patients, because of the relative absence of accidental effects.

The only consoling feature in the action of acetanilid (called antifebrin by the patentee) is in that it does not disturb either stomach or skin to the same extent as some other antipyretics. It should, however, never have an opportunity to do so, for it should never be used. Being a derivative of anilin it is poisonous. Not only has it a sedative or rather paralyzing effect on the central nervous system, but it destroys the blood and causes anæmia by changing hæmatin into methæmoglobin. That is what gives rise to the orgosis which is so frequently observed. This poisonous effect is even noticed when the drug is used externally, mainly on the young; specimens of such cases were reported to the meeting of the Philadelphia Pediatric Society on April 11, 1899, by Drs. Thompson S. Westcott, Jand and Bransor.

Phenacetin resembles acetanilid, but it is very much milder in its effects. The transformation into methæmoglobin takes place in large doses of several grammes only. Half-gramme doses for antipyretic, gramme doses for analgesic purposes are recommended in adult cases. I believe they are excessive and unnecessary. In hospital cases, the best for correct observation, I never ordered adults more than two decigrammes (three grains) as a tentative or first dose; the doses to be given to infants and children should be from fifteen milligrammes to three centigrammes (gr. $\frac{1}{4}$ - $\frac{1}{2}$).

Lactophenin's praises have been sung not only by the manufacturing patentee, but also by clinicians such as von Jaksch. Jaundice I have seen once after its administration; other cases are reported.

Alcohol has a great advantage over all antipyretics, indeed over all ingesta, by its rapid absorption in the stomach, which, as a general rule, is more of a receptacle than an organ of absorption. When we consider that a dose of 15.0 of alcohol is liable to prove fatal to a child below

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ten, the question whether it should be used at all is a grave one. Indeed there have been fanatics like a professor of physiological chemistry in Switzerland who is opposed to the use of alcohol under any circumstances. Not a thousand miles from here, this side of Chirra, there is a practitioner who proclaims that the doses of alcohol given by his esteemed colleagues are in exact proportion to their ignorance. Sarcasm, however, is not wit, and epigrammatic sneers no medical common sense, nor is the whining cant of Courtier-Suffit, in the November issue of the *Archiv. Générales*, 1899, apt to impress a thinking practitioner while dealing with the dangers of an infectious disease.

Small doses of alcohol—I always speak of diluted alcohol—diminish the vascular tone of head and skin. That is why Bunge in Basel is so frightened and speaks of the merely paralyzing effect of alcohol. The action causes a congestion to the brain, often also frequency and fullness of the pulse (like that of the nitrites), and congestion to the skin with increased sensation of warmth. In that way by dilatation of the cutaneous vessels and thereby facilitated radiation, perhaps also by the reduction of heat production the temperature of the body falls. In large doses alcohol is, therefore, an antipyretic (Binz); the doses should, however, not be measured by those acting on the well, nor should its mode of action in the sick be compared with that in the well. The same doses have different effects on the sick and well. Abbott found, for instance, that an acute alcoholic intoxication made rabbits very amenable to the effect of streptococci (more so than to that of bacterium coli or staphylococcus aureus). What does it prove? Indeed nothing else than that an organism weakened by alcohol behaves to streptococci exactly as an organism weakened by debility, or by starvation. It is not alcohol that makes the organism submit to the coccus, but its weakness and lack of resisting power.

By feverish patients alcohol is exceedingly well tolerated. In the average aseptic fevers it is rarely required, at least in their early stages, but in infectious fevers,

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mainly diphtheria, bad forms of erysipelas and sepsis generally the doses both tolerated and required may look excessive to the inexperienced. There is no better antiseptic than alcohol beverages. I claim as one of the most meritorious facts in my professional life, if there be any, to have proclaimed long before the time of most of you the necessity of giving large doses of alcoholic dilutions in the grave forms of diphtheria; indeed every case may be or become grave. There is almost no dose that is not well tolerated. What I have observed, and written these forty years, still holds good. Septic cases, with high fevers (also others so septic as to exhibit collapse), that will not improve after 100 or 200 centimetres of whiskey daily, are apt to do well with two or three times the dose, which, however, will cease to be tolerated as soon as the septic fever has passed by. Indeed I have seen such septic children of three or four years take 500.0 of whiskey a day, which had no bad influence on the brain while the sepsis lasted, but would cause alcoholic delirium as soon as convalescence began.

For a marked antipyretic effect rather large doses of alcohol are required; that is why it should not be given except in sepsis when the reduction of temperature—while necessary—can be obtained in other ways. There is no reason, for instance, why the first stages of pneumonia should be treated with alcohol. At that time irritation is not yet threatening, and therefore the indication fulfilled by alcohol in moderate doses, viz., to avoid the disintegration of albuminoids and of fat, does not yet exist. It is only in later stages, and in chronic diseases, when starvation is threatening, that diluted alcohol, which is readily absorbed in the stomach and therefore quicker in its action, is of the greatest value. Besides, four per cent. of alcohol is eliminated through the lungs, while they are in extensive congestion and overexertion, they should be spared the additional labor of elimination. I give no alcohol in the first stages of pneumonia.

Other organs which are stimulated and irritated by alcohol should not be endangered by it when inflamed.

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On the kidneys alcohol acts as a diuretic by that stimulant effect, and is contraindicated in all forms of acute or subacute nephritis. In fevers connected with brain diseases it should be avoided as a rule, like caffein, for instance, but the presence of a high temperature does not contraindicate its use when the main cerebral disturbances, delirium, or coma, are the result of sepsis.

ON THE HYDRATE OF CHLORAL

CHLORAL was discovered by Liebig, in 1830, it being the final product of the action of dry chlorine on ethylic alcohol. It is a thin liquid, of spec. grav. 1502; turns thicker gradually, and sometimes changes into an insoluble modification, with development of heat. By mixing chloral with water, the substance gets heated, and within a short time the hydrate of chloral crystallizes in needles. Its difference from chloral consists in the addition of an equivalent of water, yielding the formula $C_2 Cl_3 OH + H_2 O$. For experimental and therapeutical purposes this preparation has been found most useful when strictly pure. Impurities are not rare, as in forming chloral by the action of chlorine on alcohol, other accessory products are formed, which have the same irritating effect when in the chloral as in chloroform.

The crystalline needles of hydrate of chloral can be melted down into a solid crystalline mass. It is white or colorless. It is soluble in water; a slight opalescence is found after its being long preserved. Its odor is peculiar, melon-like, somewhat pungent. The solution in water is neutral. When muriatic acid is present in it, a slight addition of ammonia will prove a corrective. Mixed with nitrate of silver, no change of color ought to take place. When the crystals are treated with sulphuric acid, there ought to be formed a colorless oily layer turning into a solid mass before long. The watery solution, when mixed with an alkaline solution, turns milky, gets clear again, and yields some chloroform at the bottom of the test tube.¹

Before experimenting on human subjects, Liebreich submitted frogs and rabbits to the effect of the hydrate of

¹ Dr. Oscar Liebreich: *Das Chloralhydrat ein neues Hypnoticum und Anæstheticum und dessen Anwendung in der Medicin.* Berlin, 1869.

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chloral. Half a grain was injected in a frog; it showed the first symptoms in four minutes; slept in half an hour; complete anæsthesia lasted three and a half hours; and in another hour it was all well again. Another frog, after one gr., was under the influence, with complete anæsthesia which lasted twenty hours, within eight minutes. In a few hours more it was well. In a third one the experiments concerning reflex action revealed no effect when the ischiadic nerve was cut. Rabbits exposed to the influence of the drug in doses of sixteen grains, slept a few hours; one from evening to morning; one, after thirty gr., from eight p. m. to noon; one, after taking sixty gr. at seven and a half p. m., died in the course of the night. One had thirty-two gr. injected at one and a half p. m.; at 1.49 the pupils contracted, and anæsthesia commenced. Respiration at 1.52, 72; at 1.56, 54; at 1.57, 52; at 2.4, irregular, 82; after a while 72, and death occurred at 3 p. m. A dog required 96 grains for a complete effect. According to his experiments the effect on the ganglia of the heart becomes visible after the effect on brain and spine. The pneumogastric nerve appears to be unaffected, as the heart, when dissected out, does not pulsate. No less is there a direct effect on the muscle of the heart, as the ventricle, cut loose from the influence of the ganglia, contracts on irritation like the normal heart.

After many experiments on animals, Dr. Liebreich proceeded to administer the remedy to patients. Among the first cases is one of delirium tremens, related by Professor Langenbeck, in the Berlin Med. Society meeting of July 2d. A woman of forty-two years got run over on the 25th of June, 1869, and was admitted into the surgical clinic; left humerus and fibula were fractured. She had plaster of Paris applied; and, as she was suspected of being a habitual drunkard, was ordered a daily dose of four ounces of brandy. Delirium set in on the 27th; she had to be tied, but still the fractured limbs could not be completely steadied. The integuments of the fractured arm, up to the shoulder, became reddened, and gangrene appeared imminent. One-fourth gr. of chlor. morph. was injected subcutaneously three times, at intervals of half

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an hour. During the same night she took seven gr. of opium besides, without being at all affected by it. After another grain-dose, the following morning, she vomited. Then at 3.22 P. M., during a hot fever, four and a half grammes (seventy-two grains) of hydrate of chloral were given in fifteen grammes of water and fifteen of syrup. No improvement after eight minutes; after twenty-three minutes she got quiet, and closed her eyes now and then. A gramme of the remedy was then injected subcutaneously, with two of water. Five minutes after, she fell asleep; could not be awakened by roughly touching her hand; would move when pricked with a needle, but remain sleeping. Pulse and respiration were normal. She slept uninterruptedly until the following morning; only once she asked for the time. Next morning she was fully conscious, so that she could be freed from restraint. There was some hope now of saving the arm; it was kept in an appropriate and comfortable position. Patient remained quiet until the evening of the 29th, when again she became excited. After two grammes of the hydrate of chloral, administered internally, she slept all night, and no further delirium showed itself. Over the fracture, and where the soft parts were most exposed to pressure, the fragments of bone were laid bare; the wound commenced to granulate, and recovery set in soon. This case has been related in full, though briefly, because it was the first to prove that the hydr. chloral proved efficient where opium and morphia in large doses had failed; that the effect is almost instantaneous; and that the sleep of this patient with delirium tremens was not accompanied with symptoms of congestion or spasm.

After this experience, and a number of cases carefully watched, part of which have been quoted in some journals, Dr. Liebreich comes to the following conclusions, as far as the therapeutical administration of the hydrate of chloral is concerned. The dose is from 4 or 5 grs. in the new-born, to 40 or more in the adult. Insane persons and drunkards require larger doses, as is also the case with opium and morphia. The internal dose is perhaps not larger than that subcutaneously injected, according to his

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present observations. My own do not agree with these, which is the more easily explained by the fact that the patients subjected to internal treatment were not, like those in whom the remedy was injected by him, insane or drunkards. It is contraindicated by gastric ulcerations, as the remedy is slightly caustic, and in catarrhal or ulcerative affections of the larynx. In such it produces pain and cough. It has the same local effect, there, as chloroform. A slight excitement may even precede with full hypnotic effect, as in chloroform, the exciting effect of which is probably due to local irritation of the mucous membrane of the lungs, as Liebreich thinks—of the pharynx and larynx, as I believe. I may add here, in proof of my opinion, an observation frequently made by me, viz., that chloroform, when introduced into the lungs without passing the pharynx and larynx, produces no stage of excitement. A few drops of chloroform, perhaps seven or eight, when inhaled from a sponge through the tracheal tube, after tracheotomy, have an almost instantaneous effect.

Liebreich's further conclusions are, that in moderate doses of 24 grs., both pulse and respiration behave as in physiological sleep; that neither gastric disorders (vomiting, etc.) nor headache will follow its administration and effect; that it can be safely used in diseases of the heart, after or before painful operations, and in hysteria. It will be indispensable in painful inflammatory affections, acute rheumatism, and a number of neuralgias; e. g., in tic-douloureux, ischias, gastralgia, enteralgia, whooping-cough, laryngospasmus, singultus, nervous asthma, tetanus, and trismus. A probably excellent indication will be found in the fearful peripheric pain of ataxy. In cholelithiasis it will perhaps cover two indications; first, the relief of pain, and secondly, the chemical solution of the gall-stones, for which chloroform has been recommended. Chloroform, internally administered, is absorbed with too great difficulty to be of much use; while chloroform slowly and surely formed out of chloral, in the blood, will be more apt to have a safe effect.

Whether chloral will ever take the place of chloroform, as an anæsthetic for the purpose of performing painful

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operations, is a different question. The administration of chloroform, when threatening symptoms show themselves, may be interrupted at any moment; the transformation of the swallowed or injected hydrate of chloral cannot be stopped at pleasure. Whether the induced electrical current, apparently so effective in my hands, will be a sufficient safeguard, remains to be seen. I shall make further experiments to answer that question. At all events it will be difficult to determine the dose which can be given with safety, and at the same time produces anæsthesia, in individual cases—in spite of the apparently undoubted proportion between anæsthetizing and fatal doses. It appears that when 48 grains are sufficient to kill a rabbit, a third less, viz., 32 grains, will produce complete anæsthesia.

As far as the hypnotic effect alone is concerned, some of Liebreich's cases, and my own, prove its efficacy in many instances where morphia is either useless or not tolerated. In addition, Dr. Liebreich proposes smaller doses of the remedy as a sedative, in cases of nervous excitement, in insanity, and in those brain affections of infants and children where opium appears contraindicated or doubtful. Although the dangers of opium in diseases of infancy and childhood are greatly exaggerated, in part in consequence of the indications not being strictly laid out or understood, there are cases in which the primary exciting effect of the opium must be avoided. In such cases, hydrate of chloral will take its place. Availing himself of this hint, Dr. J. W. Ogle (*Lond. Lancet*, Oct. 16, 1869) has tried it in several cases. He says: It has proved most useful and satisfactory in its action as a hypnotic in small doses, viz., doses varying from 5 to 10 grs. In a slight attack of delirium tremens, 20 grs. acted very sufficiently and well in procuring sleep. In one case only did any unpleasantness attend its administration, and that was when peculiar sensations about the head were complained of by a woman suffering from chronic peritonitis, who took 5 grains. On the following night 4 grs. were given, along with a few drops of chloric ether, and no such unpleasant results followed.

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The doses in which hydrate of chloral must be given have been sufficiently stated. The only mode of its administration is in solution in distilled water. Alkaline additions must be avoided. When given internally, the chemical constituents of the food taken before or after ought to be taken into consideration. Croton water has proved entirely safe in my hands. Small doses permit of the solution in distilled water alone; larger doses, because of the bitter, pungent taste, require correction by mucilages or syrups. In this respect, as in all others, the facts and advice given by Dr. Liebreich, in his excellent pamphlet, have not been set aside or improved upon by his followers. In fact, the whole literature of the subject is still but an account of the author's experience, theory, and suggestions. Not all the additions or fault-finding of what few authors have paid attention to the subject at all, are praiseworthy or useful. In fact, although there are a great many extracts, notices, short accounts, in the journals of the last months or weeks, but very little has been added to Dr. Liebreich's original stock.

Demarquay has reported his experiments on the hydrate of chloral to the Academy of Sciences of Paris, on the 6th of September. He injected into the subcutaneous tissue of rabbits doses of from 3 to 32 grains. In all cases sleep would follow, after 15 or 20 minutes, lasting from 2 to 3 hours, with complete muscular relaxation. They would recover in a short time after coming to, and feel perfectly well after 2 hours. During the sleep the conjunctivæ and ears were injected as after a section of the sympathetic nerve, the temperature falling 1 or $1\frac{1}{2}$ degrees F. Vivisection exhibited dilatation of abdominal vessels, considerable injection of the mucous membranes, particularly in the trachea, of the brain and meninges, spine, and muscles. In addition, the arterial blood presented a slightly bluish hue. Sensibility appeared to be increased, inasmuch as pinching of ears, lips, and tail, not minded by the healthy animals, produced pain and reflex action in the chloralized animal. With normal respiration, Demarquay found the pulse considerably accelerated. Demarquay disagrees with Liebreich upon the ex-

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planation of the effect of chloral. He contends against the doctrine of chloroform being developed in the alkaline blood, for the following reasons: 1st. As there is a strong smell of chloral in the expired air, the transformation of chloral into chloroform *appears* but trifling. 2d. Chloral produces hyperæsthesia, chloroform anæsthesia. 3d. The effect of chloroform lasts but a few minutes, that of chloral a few hours. Therefore he limits his own opinion and remarks to the assertion that chloral is the most powerful agent for muscular relaxation and the speediest hypnotic. This appears to be sure then, however doubtful his objections. Numbers 2 and 3, especially, are easily disproved by any one who will carefully read Liebreich's pamphlet or Richardson's experiments—all of them showing the long duration of sleep induced in rabbits by chloroform, and the absence of the stage of excitement when the remedy was not administered by inhalation.

Richardson² experimented with a solution of 30 grains of the hydrate of chloral in 40 grains of water, it being a saturated solution; the whole making a fluid-drachm. Chloroform was found to be formed by mixing this solution with fresh blood. In pigeons, weighing from 8½ to 11 ounces, narcotism was produced readily by the administration of from 1½ to 2½ grains of the hydrate. In these animals the dose of 2½ grains was the extreme that could be borne with safety, and a dose of 1½ grains was sufficient to produce sleep and insensibility. The full dose of 2½ grains produced drowsiness in a few minutes, and deep sleep with entire insensibility in twenty minutes. Before going to sleep there was in every case, whether the dose was large or small, vomiting. As the sleep and the insensibility came on, there was in every instance a fall of animal temperature; and even in cases where recovery followed, this decrease was often to the extent of five degrees. The respirations also fell in proportion, declining in one case from 34 to 19 in the minute during the stage of insensibility. From the full dose that could be borne by the pigeon, the sleep which followed lasted from three and a half to four hours. Six hours at least were re-

² From *Med. Times and Gazette*, Sept. 4, 1869.

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quired for perfect recovery. During the first stages of narcotism in pigeons, the evolution of chloroform by the breath was most distinctly marked.

In rabbits weighing from 83 to 88 ounces, 30 grains of hydrate were required in order to produce deep sleep and insensibility. A smaller dose caused drowsiness and want of power in the hind extremities, but no distinct insensibility.

When the full effect is produced in rabbits, from the administration of the large dose, the drowsiness comes on in a few minutes; it is followed by want of power in the hind limbs, and in fifteen minutes by deep sleep and complete insensibility. The pupil dilates, and becomes irregular; the respiration falls (in one case from 60 to 39 in a minute), and the temperature declines 6° Fahr.; sensibility returns with the rise in number of respiratory movements, but in some cases falls again during the process of recovery. The drowsiness, or, if the animal is left alone, what may be called sleep, lasts from five and a half to six hours. But it was observed that the period of actual anæsthesia was very short, lasting not longer than half an hour, after which the skin seemed rather more than naturally sensitive to touch. During recovery there are tremors of muscles almost like the rigors from cold, due probably to the great failure of animal temperature.

In frogs a grain of the hydrate causes almost instant insensibility, coma, and death.

In further prosecution of his research, Richardson tested, on similar subjects, the effect of chloroform, bichloride of methylene, tetrachloride of carbon, and chloride of amyl. In all the observations with these substances, the narcotizing agent was used by hypodermic injection. It was found, as a result of these inquiries, that seven grains of chloroform, five of tetrachloride of carbon, and seven of chloride of amyl. produced the same physiological effect as two grains of the hydrate. Seven grains of the bichloride of methylene induced a shorter insensibility. A rabbit subjected to 30 grains of chloroform slept four hours and twenty-five minutes; and a pigeon subjected to seven grains slept three hours and twenty-five minutes. All these agents

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caused vomiting in birds, before the insensibility was pronounced, the same as did the hydrate; but in no animal was there any sign of the stage of excitement which is seen when the same agents are administered by inhalation. This fact is most important as indicating the difference of action of the same remedy by difference in the mode of administration. The temperature of the body was reduced by the agents named above, but not so determinately as by the hydrate.

Two animals, pigeons, made to go into profound sleep, the one by the hydrate, the other by chloroform (each substance administered subcutaneously), were placed together, and the symptoms were compared. The sleep from the chloroform was calmer; there was freedom from convulsive tremors, which were present in the animal under the hydrate; and recovery was, it was thought, steadier. It was observed (and the fact is well worthy of note) that no irritation was caused in the skin or subjacent parts by the injection of the chloroform and other chlorides.

The neutralizing action of the hydrate on strychnine was tried, and it was determined that the substance arrests the development of the tetanic action of the poison for a short period, and maintains life a little longer afterwards, but does not avert death. This subject deserves further elucidation.

When the hydrate of chloral is given in an excessive dose, it kills; there are continuance of sleep, convulsion, and a fall of temperature of fully eight degrees before death.

The post-mortem appearances were noticed after a poisonous dose. The vessels of the brain were found turgid with blood. The blood is fluid, and the coagulation is delayed (in a bird to a period of three minutes), but afterwards a loose coagulum is formed. The color of the brain-substance is darkish pink. The muscles generally contain a large quantity of blood, which exudes from them, on incision, freely. This blood coagulates with moderate firmness. Immediately after death all motion of the heart is found to be arrested. The organ is left with blood in both sides, but with more in the right than in

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the left. The color of the blood in the two sides is natural, and its coagulation is moderately firm. The other organs of the body are natural.

Other observations are made on the changes which the blood undergoes when the hydrate of chloral is added to it. The corpuscles undergo shrinking, and are crenate; and when excess of the hydrate is added the blood is decomposed in the same way as when treated with formic acid. The summary of the author's work may be put as follows:

Hydrate of chloral, administered by the mouth or by hypodermic injection, produces, as Liebreich states, prolonged sleep.

The sleep it induces, as L. also shows, is not preceded by the stage of excitement, so well known when chloroform is administered by inhalation.

The narcotic condition is due to the chloroform liberated from the hydrate in the organism, and all the narcotic effects are identical with those caused by chloroform.

In birds the hydrate produces vomiting in the same manner, and to as full a degree, as does the chloroform itself.

The sleep produced by the hydrate of chloral is prolonged, and during the sleep there is a period of perfect anæsthesia; but this stage is of comparatively short duration.

The action of the hydrate is (as Dr. Liebreich assumes) first on the volitional centres of the cerebrum; next on the cord; and lastly, on the heart.

Experiment on a Rabbit.—The solution used for an experiment made on a rabbit yesterday, was prepared in the following manner: An ounce of hydrate of chloral was dissolved in 10 drachms 40 minims of distilled water; it formed 14 fluid drachms when the solution was perfect. Thus, one drachm of fluid contains 34.3 grains of the remedy. Such a drachm was injected into the subcutaneous tissue at

4.30, p. m. Normal temperature in the rectum 102° F.

32. Pupils contract.

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- 33½. Gets uneasy, drags his hind legs.
35. Pupils dilate again.
37. Respirations 84. They were not counted before, nor was the pulse, as the animal was much excited.
38. Hind legs relaxed.
39. Respiration 52.
40. Slight reflex action of the hind legs and muscles of the face. Anæsthesia.
41. Temperature, 102° . No reflex action, except in the face, especially of the bristles.
43. Respiration 57.
- 43½. Temperature begins to fall by $\frac{1}{4}^{\circ}$.
45. Pupils do not react under the influence of light.
- 46½. A little more reflex action, kicks with the feet of right side.
48. Temperature $101\frac{3}{4}^{\circ}$.
49. Respiration 50.
50. Temperature $101\frac{1}{2}^{\circ}$.
51. Temperature 101° . Very slight reaction of orbicular muscles.
- 52½. Temperature $100\frac{3}{4}^{\circ}$.
55. General anæsthesia. Touching with a knife makes no impression, except reflex action in the face, on the corresponding side.
- 56½. Temperature below 101° .
- 5.01. Temperature $101\frac{1}{2}^{\circ}$. Pulse almost innumerable, irregular in size.
5. Temperature 100° . Respiration 50, deeper.
10. Temperature $99\frac{1}{4}^{\circ}$.
15. Reflex action greatly diminished.
18. Temperature 99° .
34. Temperature $98\frac{1}{2}^{\circ}$. Respiration 55.
38. Temperature 98° .
- 43½. Temperature $97\frac{1}{2}^{\circ}$.
48. Temperature 97° . Respiration 49.
53. Temperature $96\frac{1}{2}^{\circ}$. Respiration 54.
- 6.00. Temperature 96° . Respiration 54. Reflex action very slight, and on the orbicular only.
5. Temperature 94° .

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9. Temperature $92\frac{1}{2}^{\circ}$. Respiration 48. Cornea tarnished. No reflex action.
13. Temperature $90\frac{1}{2}^{\circ}$. Respiration 46.
- 13 $\frac{1}{2}$. Temperature $89\frac{1}{2}^{\circ}$. Respiration as deep as before.
14. Temperature 90° .
- 15 $\frac{1}{2}$. Temperature $91\frac{1}{2}^{\circ}$.
17. Temperature $90\frac{1}{2}^{\circ}$.
19. Temperature 92° . Heart beats very rapidly.
20. Temperature 93° . Respiration 52.
21. Temperature. Reflex action more decided, also when the lower eyelid is touched, also when the external canthus is touched.
22. Temperature 94° .
25. Temperature $93\frac{1}{2}^{\circ}$. Less reaction, mostly at the external canthus.
31. Temperature $92\frac{3}{4}^{\circ}$. Respiration 48. Good reflex action, all over the face.
36. Temperature 93° . Respiration 48.
39. Pushing the bulb in further by $\frac{1}{2}$ inch, increases the temperature by $1\frac{1}{2}^{\circ}$ — $94\frac{1}{2}^{\circ}$.
47. Temperature $95\frac{1}{4}^{\circ}$. Respiration 56.
55. Temperature 95° . Respiration 54. Good reflex action in the face.
- 7.05. Temperature $94\frac{1}{4}^{\circ}$. Respiration 50.
15. Temperature $93\frac{3}{4}^{\circ}$. Respiration 52. A strong induced current applied to the respiratory muscles for 4 minutes, increases respiration to 66, but does not influence the temperature. Four minutes afterwards, respiration 54.
50. Temperature $93\frac{1}{2}^{\circ}$. Respiration 57. The induced current was again applied for some minutes, one pole (metal) applied to the lips, one (moist sponge) to the femoral nerve. Violent reaction set in, and voluntary movements of the feet and the head; temperature not changed.
- 8.30. Temperature $92\frac{1}{2}^{\circ}$. Respiration 66. Eyes clear. Now and then a voluntary movement of the legs, right side, on which it lies.
45. Temperature 92° . Respiration 64. For the last

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15 minutes occasional reflex movements of all extremities and neck. Attempted several times to rise upon fore feet. Sniffed. Muscles, especially of neck, less flaccid.

50. Attempted to rise without having been touched for 5 minutes.
- 9.00. Again attempted to rise. Temperature $92\frac{1}{2}^{\circ}$. Got up on its belly and moved about by means of all-fours. Eyelids, always open hitherto, close and remain closed. It becomes necessary to remove the thermometer from the rectum. At the attempt at replacing it a minute after, she opened her eyes and resisted. The approach of the finger causes contraction of the lids.
11. Got up on four legs again. Temperature 93° . Respiration 68. Attempt at introducing thermometer causes violent resistance from hind legs. Pressure of thermometer causes nipping action of perinæal muscles.
30. Temperature 93° . Respiration 70. Winks.
45. Temperature $93\frac{1}{2}^{\circ}$. Respiration 68.
55. Stands firmly on her feet; clings with her claws to the bottom of the box. Urinates a small stream.
- 10.00. Temperature 93° . Respiration 66.
15. Begins to look about, and holds ears normally. Sniffs.
30. Temperature $92\frac{1}{2}^{\circ}$. Respiration 64. Thermometer previously warmed and retained in rectum five minutes. She sits up naturally, and exhibits nearly normal activity and strength. When thrown on her side, the weakness of her limbs is very marked in her attempts at getting up.
- 11.00. Temperature $92\frac{1}{2}^{\circ}$.
30. Temperature 94° .
45. Temperature 94° .
- 12.00 Temperature 94° . Respiration 72. Pulse fast and fluttering.

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- 12.30 A. M. Temperature 95° . Respiration 75. Bread thrown out to her, and the cabbage in the box, are not touched. A saucer of water is also neglected. When her lips are forcibly drawn down to it, she sips about an ounce with evident appetite.
- 1.00. Temperature $95\frac{1}{2}^{\circ}$. Urinating.
45. Temperature 95° .
- 2.45. Temperature 95° .
- 3.30. Temperature 96° .
- 5.00. Temperature $94\frac{1}{2}^{\circ}$.
- 6.20. Temperature 93° .
- 8.08. Temperature $92\frac{1}{2}^{\circ}$.
- 10.00. Temperature 89° . Has been under a cold window, and is therefore placed at the furnace register.
- 12.30 P. M. Temperature 89° . Respiration 80.
- 2.00. Temperature $88\frac{1}{2}^{\circ}$. Has eaten some in the course of the morning, and drank several times. Has urinated also. Moves freely, but is not very active.
- 5.00. Temperature $87\frac{1}{2}^{\circ}$. Is sluggish in her movements; does not want to lie down, however.
- 7.00. Temperature $87\frac{1}{2}^{\circ}$. The same condition. Quiet. No appetite.

SECOND EXPERIMENT, ON A SMALLER RABBIT

Temperature of rectum, 102° . Respiration 100 per minute.

- 1.18 P. M. Injection of 7 gr. of hydrate of chloral into femoral vein. While the piston of the syringe was still being slowly pushed in, the animal suddenly struggled, cried, and became relaxed; respiration seemed to be suspended, though the heart beat quite as rapidly as ever. In about half a minute respiration was re-established, but with only 52 per minute.
- 1.24. Temperature $100\frac{1}{2}^{\circ}$. Respiration 72, mostly abdominal. Eyes open; pupils somewhat contracted. Reflex action only about the face.

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Sphincter ani relaxed; during the struggle a faecal bolus had been expelled.

- 1.30. Temperature 100° . Blood-vessels seen in wound and neighboring skin more distinctly than formerly. On the inner side of thigh, a large vessel which was formerly perceptible, is now tangible through the integuments.
- 1.35. Temperature $98\frac{3}{4}^{\circ}$.
- 1.40. Temperature 98° . Some movement of right hind leg.
- 1.45. Temperature $97\frac{1}{2}^{\circ}$. Respiration 76.
- 1.50. Temperature $97\frac{1}{2}^{\circ}$. Pushing thermometer-bulb rudely about in the rectum, causes jerking of fore and hind legs, and repeated screams. Moving about the bulb in rectum seems sufficient to cause general spasm.
- 1.55. Temperature $97\frac{3}{4}^{\circ}$. Respiration 68. Pinching the ear caused jerking of the head and fore feet.
- 2.00. Temperature $97\frac{3}{4}^{\circ}$. Respiration 68. Good deal of general reaction, with a cry. When the mouth is irritated, it attempts to close the jaws, and afterwards moves the tongue about in the mouth as if tasting.
- 2.15. Temperature $96\frac{1}{2}^{\circ}$.
- 2.20. Muscular movements preceded by tremor. Pinching ear causes general tremor, and some independent movement of head and fore legs. Nasal alæ act in respiration.
- 3.50. Temperature $96\frac{1}{2}^{\circ}$. Rests on all-fours; totters and attempts to escape. Respiration 94.
- 3.00. Temperature 98° . Respiration 120. Pretty lively, though still weak.
- 5.00. Temperature $100\frac{1}{4}^{\circ}$. Is lively, eats and drinks. Evidently the small dose injected into the vein had a very powerful and rapid effect, from the whole being changed into chloroform at once. This fact explains, however, why the effect disappeared so rapidly.
- 7.00. Temperature 102° .

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CASES IN PRACTICE

I. The first patient to whom I administered the hydrate of chloral was a man on board the steamship *Hammonia*. He had been very seasick during the rough passage from Hamburg to Havre, and from Havre onwards. On the 29th of September, he had been without food and sleep for some days; nausea and retching still continued, and he commenced to show the symptoms of approaching exhaustion. I injected into the spare subcutaneous tissue of his abdominal wall, a solution of half a drachm of hydrate of chloral in a drachm of distilled water. His pulse of 90 fell to 68 in twelve minutes, the temperature not being measured, and within a quarter of an hour he fell asleep. He awoke after two hours, asked for food, took a cupful of beef-tea, and retained it. For twenty-four hours he improved; and even in the heavy sea of the following days, was not so sick as to induce me to experiment on him again.

II. A lady of 20, who had suffered from metritis and vesical catarrh for years, and from severe hemicrania, sympathetic vomiting, and sleeplessness, together with serious hysteric attacks during and after menstruation, was taken with the same symptoms in a more than ordinary degree, about the 18th of October. Morphia and codeia did not relieve her complaints, which were further increased by a mucous intestinal secretion and tenesmus. Two evenings in succession and one morning she was given two scruples of the hypnotic dissolved in two tablespoonfuls of (Croton) water, the medicine each time procuring a sound and quiet sleep, with evident diminution of the morbid symptoms after awaking. No such symptoms, belonging either to the brain or the stomach, as are noticed after the use of morphia or chloroform, were perceptible.

III. A lady of 25, has suffered from intense parametritis after her second confinement, some years ago. She has never entirely recovered. Her ailments have been increased by hæmatocele, repeated three times in the course of 20 months, each time taking place during menstruation. There is in her pelvis an old exudation in the left broad ligament,

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resulting in local and mammary pain, besides a neuralgic pain along the crista ilii; and, besides, the remnants of those hæmatoceles, pressing the uterus downwards and forwards in prolapse and ante flexion. In consequence of the malposition and some catarrh, her bladder must be emptied from twelve to fifteen times a day, and then she is compelled to rise from six to seven times every night. That her menstruation is very much disturbed by local pain and general symptoms, I need hardly add. She took, two nights before her menses set in, and when the symptoms became aggravated, two scruples of the hydrate of chloral in a tablespoonful of water, and had an uninterrupted quiet sleep for 10 hours, after having not enjoyed a single quiet night for years, in spite of the internal and subcutaneous use of all sorts of narcotics. The next night she had the same effect from two scruples. Her menstruation set in the following day, and she kept her bed, as always during that period, to prevent any disturbance. The dose was reduced to half a drachm for four subsequent nights, each time with the above result. No headache, no constipation, nor any other untoward symptom showed itself afterwards, the effect being confined to producing a sound sleep; for the symptoms, as mammary pain and vesical spasm, returned every day after she woke up. I am not yet prepared to say whether the remedy will have, in this case, a lasting antineuralgic effect, as the original cause is not removed; but the nervous irritability may still be allayed to such a degree as to render her sufferings much more endurable. That such an effect is likely to take place I feel like concluding from the fact that this last menstruation was not disturbed by hysteric attacks, from which my patient has frequently suffered during this period.

IV. A lady of 30 was confined, on the 19th of October, of her sixth child. Her physical condition has always been tolerably good, with the exception of slight parametritic troubles after her third confinement. This affection was combined with sacral neuralgia, which lasted much longer than the presence of chronic parametritis could be proved (even after she had been confined with two

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more children), and neuralgic affection of the muscular insertions along the lower dorsal and the lumbar spinous processes. Now and then she would also, when slightly out of health, be attacked with hysteric symptoms belonging to her brain and pneumogastric nerve. After this last confinement she appeared feeble and more irritable than ordinarily; and on several days, in the afternoon and evening, her temperature would rise to 103° and 104° without my being able to diagnosticate a tangible cause. She was feeble, irritable, sleepless, and had crying spells and other hysteric symptoms. She was sleepless to an embarrassing degree, neither quinia nor morphia relieving her of this symptom. Three-quarters of a grain of morphia, administered in the course of twelve hours, procured no sleep, but left her, for about twenty hours after the last dose of three-eighths of a grain, more hysterical and restless and sleepless than before. In addition, a contracted pupil, dry tongue and delirium, showed the dose of morphia she had taken to be larger than she could well tolerate. In this condition, on the sixth evening at nine p. m. (after a dose of forty grains of bromide of potassium had been also used on the fifth with no effect or very little), a dose of two scruples of hydrate of chloral was given internally, in two tablespoonfuls of water. Within twenty minutes she was asleep, awoke after three hours to drink water, fell asleep again; and, although getting awake from time to time, passed a good night, felt rested and satisfied in the morning, had no headache, a better appetite than any previous day, and no more hysteric attacks.

V. A lady of 48, of Brooklyn, I saw in consultation a week ago. She suffers from pulmonary consumption. There is dull percussion-sound, both anteriorly and posteriorly, over her right lung, and bronchial respiration, and partially roughened respiratory murmur, on the left side. For six weeks past, after having been hoarse for a long time, she has lost her voice from laryngeal ulcerations, which appear to be very extensive, inasmuch as the usual form, in such cases, of pharyngeal degeneration has already developed itself. She coughs a great deal; has pains be-

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longing to the larynx, pleura, and diaphragm; and, partly from general distress, partly from fever and cough, sleeps but little and interruptedly. Morphia has relieved her for some time, but its effect, although the doses have been increased, is ceasing to be satisfactory. She took a dose of forty grains of the hydrate dissolved in but little water, on the evening of the 24th of October, and passed a better night than before, in spite of the copious laryngeal, tracheal, and bronchial secretion and cough, waking her a number of times. A single disagreeable symptom, however, was noticed, viz., pain in the ears. The patient complained bitterly, evidently from the effect of the remedy on the mucous membrane of the throat. Undoubtedly the pungent taste and effect of the agent might have been reduced or obviated either by the addition of more water, or by its mixture with a mucilage. Of this patient, no news has reached me since.

The preceding remarks are the statements of Liebreich and his followers, especially Richardson's experience and my own up to this day. Limited though this is, it coincides well in most respects with the results of my predecessors. This much is sure in my mind—that Dr. Liebreich need add no other discovery to this one, to deserve the gratitude of both the profession and mankind for his valuable addition to our therapeutical treasures. I hope I have impressed the gentlemen who have so long listened to me with the necessity of studying the subject of this paper; and I do not hesitate to express my belief that there is a great future in store for the hydrate of chloral.

For future investigations I propose the following questions:

Why is it that Richardson has met with vomiting, while neither Liebreich nor myself has been troubled with this disagreeable symptom?

Will hydrate of chloral reduce the temperature of a sick animal (say in pyæmia) as surely and steadily, in large or small doses, as in the healthy one, and is it promising of effect as a febrifuge, perhaps even happier than that of quinia.

What is the proper antidote in case of poisoning? and

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will the induced current prove such antidote, as some observations in my experiments appear to show?

All of these questions I take the liberty of here proposing, for your consideration and study; and if I should succeed in future in answering them, or one of them, myself, I shall feel but too happy to be permitted to state my results here, for your further examination and judgment.

MEDICAL TREATMENT OF THE DISEASES OF THE STOMACH

MR. PRESIDENT: In the short time you placed at my disposal I shall review the more important remedies available in gastric disorders, the principal symptoms attending them; and a few of the local affections, such as ulcer, hemorrhage, and cancer. What I have the honor of presenting, is not claimed as new, or "modern," but is offered as what I have been, and am, in the habit of recommending and employing.

Some of the abnormal conditions of the stomach depend on anomalies of distant organs. Hyperæmia and catarrh result from disorders of circulation in the chest and abdomen. Incipient pulmonary tuberculosis, chronic pleurisy, particularly the diaphragmatic form, peribronchitis, emphysema, every variety of asthma, diseases of the heart and the great blood-vessels are frequently the causes of the various forms of dyspepsia. It is these causes which require treatment and not to the same extent the gastric disorders. Thus it is that the latter may be remedied by gymnastics of the chest, or by digitalis.

Irrigation through the stomach-tube is indicated, and frequently does good, when there is protracted nausea and inflation, and the taste is sour or bitter. To continue this treatment indefinitely is not indicated, or to rely on its continuation for its moral or psychic effort is injudicious, for a neurotic patient will not be influenced more by ten irrigations than by two. On the other hand, it is true that two or three irrigations will hardly suffice sometimes to clear the cavity of all the remnants of food that may have accumulated. Cases of sarcina are particularly obstinate.

Irrigations are certainly contraindicated in most cases of gastric ulcer, of acute gastritis, except in cases produced

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by poison or fermenting food, in painful and in ulcerative pharyngitis, and they ought to be made with great caution when the sound has to pass a dilated heart, a large aneurism, or an elevated or strictured œsophagus. The tube should have a double opening at its lower end, it should be soft, and must not be carried far beyond the cardia. By measuring the distance from the chin to neck and along the vertebral column down to the ninth dorsal vertebra the necessary length can be found. The tube may be moistened with warm water—vaseline and glycerine are nauseating to many—and is carried down to the œsophagus; then the patient is told to make the movement of deglutition, and repeat it when the tube reaches the level of the larynx. He must breathe regularly and hold his basin with both his own hands; 500 gm. of water, or warm alkaline water are then run in, once or several times; it is not the whole amount that will come up again, for a small part will be absorbed in the stomach, and more is apt to escape into the intestines. A slight up and down movement before withdrawal prevents the mucous membrane from being caught and torn.

Irrigations are indicated when large masses of mucus cover the interior of the stomach and separate the ingesta both from the absorbent and the secreting epithelium. In these cases chloride of sodium and carbonates act as solvents. In bad cases of chronic gastritis solutions of nitrate of silver (1 to 2000) will do good after warm water with carbonate of sodium (not the chloride) had preceded them; also warm water in which subnitrate of bismuth has been suspended.

Papayotin (Papain), the powder, or a five per cent. solution, digests meat. In an atonic and non-secreting stomach it is therefore an excellent aid to digestion. Such specimens of disintegrated meat and cheese I demonstrated to the State Society when ten years ago I detailed the effect of the remedy on croup membranes. My remarks on that occasion have been utilized contrary to my protest by a mercantile firm who advertise a preparation which they call papoid. How much papayotin is contained therein the gods and the firm's chemists may know. I do not,

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but I do know that the use of my name in the circulars is an unmitigated fraud.

Pancreatin, the ferment of the pancreas, transforms starch into dextrin and sugar, splits fat, when emulsionized in the pancreatic juice, into glycerine and acids, and peptonizes albuminoids in alkaline solution. In acids it has no such effect, indeed it is decomposed. Therefore I never comprehended what good it could do when introduced into the acid stomach.

Pepsin in water and hydrochloric acid dissolves albuminates. When the stomach furnishes none, or an insufficient quantity, for instance in anæmia, chronic tuberculosis, or scrofula, in old age, in convalescence, its medicinal administration is beneficial, inasmuch as it facilitates the digestion of nitrogeous foods. But it is inert unless accompanied with dilute hydrochloric acid. Solutions in glycerine will keep in alcohol but a short time; therefore wines of pepsin which have been preserved a long time are liable to have but little efficacy.

Bismuth. The subcarbonate, subnitrate, salicylate, or subgallate are less appropriate in gastric catarrh than they are in other forms of subacute or chronic gastritis, and mainly in ulcer of the stomach. It is a gentle and anti-fermentative protection to the mucous membranes and its nerve branches. The gastric neuralgia of the anæmic, the hysteric, and the pregnant are favorably influenced by it. In the same way, besides binding hydrogen sulphide, which is a potent cause of peristalsis, it protects ulcerations of the intestines, prevents their reflex effect and relieves diarrhœa.

The merits of *nitrate of silver* have become dubious in regard to most of the claims advanced for it. It was expected to heal ulcerations and to relieve gastric pain. The main objection to its use was the fact that there is always so much sodium chloride in the stomach; that is true, but when nitrate of silver is to be used, the amount of salt in the stomach need not be larger than the physiological condition of the gastric surface requires. Therefore, whoever is to take nitrate of silver must not have before taken salt in his food, and ought to have a fairly

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empty stomach. In that condition the mucous membrane of the stomach is as amenable to the action of the nitrate as that of the pharynx or nose. It is desirable to have a similar method of administration, or rather application, in all of these cases. Pills will certainly not be so reliable as a solution, and the dilution ought to be large enough to render the distribution of the solution over a large extent of the stomach probable. An adult may take from one-half to one grain in four ounces a day, a tablespoonful every two, or two tablespoonfuls every four hours. The smallness of the doses is no objection. The greatest dilutions, 1 to 2000 to 5000 are known to find their way most readily into and between the epithelia. To influence a large part or the whole extent of the stomach interior, a few grains of nitrate of silver in a pint of water may be employed for irrigation.

Charcoal, I am told, is a very disappointing drug. I do not share that opinion. It is expected to bind gas, and so it does; but this property is nearly lost when it is wet. Besides, the charcoal mostly in use with us is vegetable charcoal, while the animal preparation is known to absorb about thirty times as much as the former. I never prescribe anything but carbo-animalis. To have its full effect it ought to reach the stomach in its dry state if possible. That can in part be accomplished by giving the drug in wafers or in capsules.

Amara (bitters) are stimulants appropriate for atonic condition of the stomach, both primary and secondary, mostly in anæmia, chlorosis, and exhaustion by sexual excesses. The roots of gentian and calumba, the wood of quassia and of dandelion and Irish moss belong here. Their effect is but mild, their action by reflex on the secretion of saliva is known but not marked, that on the secretion of gastric juice is doubtful. Thus it is that they are often administered in tinctures which contain ethereal oils and alcohol, both of which are more active. The latter do not agree with acute gastric catarrh and ulceration. One of the best known, for good and evil, is cundurango. In America it began its career in 1871, in 1874 in Germany. I well remember the stir it made in

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the newspapers of the day. It was imported by a downtown firm from Ecuador and cured every case of cancer of the stomach. To return the compliment, the same firm exported large invoices of Scott's cancer remedy to cure the cancers of the stomachs of the people of Ecuador. Such is fraternity and solidarity. After a while, when the excitement was over, cundurango was found to be an excellent amarum. A decoction of 15 in 300, made after a maceration of twelve hours, so as to leave 150, acts quite favorably. So does the extract of cundurango, one or two grains of which may be administered five or ten times a day.

In the same direction are active other bitters and the aromatics, the mints, cardamom, caraway, cascarilla, mace, pimento, ginger, cinchona, pepper.

Most of us will prefer one or very few or none of the substances mentioned. When given in tinctures or in extracts, they may be combined with adjuvants and corrigents, in liquid or pill form, with quinia, iron, etc. Some of us are still fond of orexin, the indispensable cure-all, the effect of which has always appeared doubtful to me. The best of all the bitters is *nux vomica*; its tincture, fluid extract, solid extract, and its alkaloid permit of many ways of administration and combination, with good effect.

Rhubarb in small doses has no cathartic effect, but through its gallic acid is rather constipating. In doses of from 2 ctgr. to 2 dcgr. several times a day it acts favorably in chronic gastric catarrh and nausea and vomiting depending thereon. In small doses it improves the appetite, particularly in scrofulous and rickety children, when feeble digestion, or dyspepsia follows an attack of diarrhœa. The aqueous tincture of rhubarb which has been received from the German Pharmacopœia into our "National Formulary" is a good preparation. Adults take one-half to one teaspoonful after meals. Our aromatic tincture of rhubarb is a good preparation when the stimulating effect of alcohol is required.

Motory incompetency may be the result of gradual decrease of muscular strength in anæmia, slow convalescence, etc., or depend on a congenital, either general or circumscribed, insufficiency, but is mostly the outcome of a pro-

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tracted catarrh and dilatation. It is quite frequently combined with insufficient secretion of gastric juice. These are the cases in which orexin has been recommended. Amara and diluted alcohol, spices, aromatics, internal douching, external douching, both cold and hot, massage, electricity, both externally and internally, appear indicated. Pepsin and hydrochloric acid are required when the secretion is more defective than the contractility.

Lack of hydrochloric acid results from defective innervation, in anæmia and convalescence, or from local causes; atrophy of the glands, cicatrices, or tumor. The secretion of pepsin is defective at the same time. Both have to be supplied in the shape of medicine.

Excess of acid, however, is more frequent. Its over-secretion may be due to chronic gastritis, ulceration, or neurosis. In some instances it is due to a chronic dyspepsia, depending on the abuse of tobacco or of alcohol, or both. With the exception of the cases of over-acidity from ulcer which yield a local pain, that excess is characterized by a more extensive pain than is attributable to a local lesion. Whatever excites the gastric secretion must be avoided. Instead of chloride or bicarbonate of sodium, of aromatics, of acids, give nitrate of silver 1 to 3000 to 6000, in tablespoonful doses, also some opium. If a purgative be required, give sulphate of sodium. Not infrequently the over-secretion of hydrochloric acid accompanying the first stage of a subacute gastric catarrh gives way, in the further stage, to under-secretion. In that case the treatment of the catarrh, including irrigations, is indicated.

The treatment of ulceration will be referred to later.

The neurotic cases require slow eating to avoid suddenness of secretion, more animal food but no fat, no carbonic acid, and the treatment of the neurosis of the stomach, which will be detailed later on.

In all cases antacids are indicated, such as prepared chalk, bismuth, or magnesia, but they are liable not to have the same favorable effect as when they are given when the secretion is not of hydrochloric but of butyric acid, which is the principal and most objectionable result

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of undue fermentation. The presence of this acid is an obstacle to digestion and ought to be neutralized before food is taken. Magnesia must be given ten minutes before a meal in sufficient doses. Quite often the presence of this acid accompanies a chronic catarrh with insufficient gastric juice. Thus I frequently, after giving the antacid before every meal, administer pepsin and dilute hydrochloric acid toward the end of, or after it.

Round ulcer of the stomach requires, theoretically speaking, absolute rest of the stomach until the ulceration can heal. That indication cannot be filled. But the only food endured and permissible is milk, not to be drank, but eaten with a teaspoon. It ought to be boiled or sterilized, and the stomach kept alkaline. Magnesia can be taken in daily doses of two or three grammes for some time without giving rise to diarrhœa. If larger doses of alkali than the above be required, and diarrhœa be feared, bismuth may be added from two to four grammes a day, or prepared chalk, or phosphate of lime. It is desirable to take no carbonate, not even the sodium salt, in order not to inflate the stomach. The total daily amount must be given in eight or ten doses. They may be so arranged as to precede by a few minutes the meals, which ought to be small but frequent. Opiates will enforce rest, and are, in the beginning of the treatment, in doses of from 10 to 15 milligr. every two or four hours, almost indispensable. Irrigation ought to be avoided as a rule. I have many years ago irrigated with a high dilution of nitrate of silver. Bismuth subnitrate has been thus used, but instruments are dangerous inside an ulcerated stomach, and bismuth taken internally will probably cover the sore surface as well as if thrown in when suspended in water.

The vomiting and neuralgia of neurotic persons are frequently the despair of the physician. They are as curable and incurable as other symptoms of hysteria. By attending to the person you may conquer the organ. So the medicinal and hygienic armamentarium will be in pressing demand. Opiates ought to be avoided if barely possible. Cocaine has been recommended very highly; I cannot say

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that I have seen it doing much good. It has been customary to employ cerium oxalate, mainly, in the vomiting of pregnancy; nitrate of silver has failed me entirely in these cases. Three remedies have often aided me. One is the tincture of iodine, in half to one drop doses every one, two, or three hours, the other is arsenious acid, in doses of one-third or one-fifth of a milligramme every two or three hours, and zinc, either the valerianate from seventy-five to one hundred and twenty-five centigrammes daily in divided doses, with or without bismuth, or the oxide in four or six daily doses of from two to five centigrammes each. Menthol and alcohol (1 to 10) applications to the præcordia have sometimes proved successful. In the vomiting of pregnancy, wine of ipecac, one drop every hour, has given satisfaction. One of the symptoms of stomach neurosis is rumination, regurgitation of part of the food taken. Though the symptom be by no means rare, I do not remember a case, in adult or children, but exhibited quite an array of neurotic symptoms. Thus general tonics, sea-bathing, cold ablutions and frictions, strychnia, zinc, ferri carbonas, are the remedies required. Electricity—the interrupted current—will sometimes prove effective, one electrode over the neck, the other over the epigastrium. Often the metal brush, short applications, works better than the wet sponge.

There are other cases of vomiting having their origin in distant parts. Chronic peritonitis with adhesions, will result in obstinate constipation. Now constipation, from whatever cause, is liable to give rise to obstinate vomiting, extending over many weeks, even months. I have seen them getting relieved by purgatives and rectal irrigations. *Qui bene purgat bene curat.*

When vomiting attends acute gastric catarrh, and is so persistent as to render both feeding and medication impossible, calomel, given in sufficient doses, will be absorbed in the mouth, and have its full effect as a purgative. Now and then leeches, ice, hot fomentations, dry cupping, may relieve the gastric congestion or irritability. When food is thrown up after being taken, a small dose of morphia on the tongue, in solution or in tablet form, five

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or ten minutes before eating, will make it endurable. In this way even anæmic vomiting can be moderated.

In cases of protracted fermentation in the stomach, attention must be paid to the foods and other ingesta, among the latter to the swallowed secretion of the nose and pharynx. Many a case of putrid dyspepsia can be effectually cured in the nose and mouth. Irrigation of the stomach with water, salt water, salicylic acid 1 to 1000, thymol 1 to 2 to 3000, or hypermanganate of potassium 1 to 2000 will find their indications. But they cannot be employed forever, and in most cases the powers of the stomach will not be restored by them. Among the anti-fermentatives I mostly use, is dilute hydrochloric acid. Thirty or forty drops in a quart of water will form an appropriate drink through twenty-four hours. Bismuth and its phenol combinations acts very well, but not by themselves alone. Creosote in daily doses of from eight to twenty-five drops, creolin in similar doses, plentifully diluted, act very well. So does hypermanganate of potassium, 1 to 2000, in frequent teaspoon or half tablespoonful doses. Resorcin, from seventy-five to one hundred and fifty centigrammes a day, divided into four or six doses, one to be given fifteen minutes after meals, and now and then between, mixed or not with bismuth; bicarbonate of sodium acts very well. Calomel acts better on the intestines than on the stomach. Chlorine, iodoform, and naphthaline have been given for the disinfection of the stomach. But stomachs which require disinfection are generally too irritated and irritable to tolerate just these three. Aromatics may be given. The elæosacchara of fennel and mint have been added to the "National Formulary." They are pleasant and efficient additions to bismuth, calomel, etc., in children's ailments.

Hemorrhage.—No sounding, no irrigation. Seldom will the stomach as much as tolerate chloride of iron or acetate of lead. Besides, in the doses which can possibly be introduced, they do as little good in hemorrhages from the surface of the stomach as from another integument. Avoid the internal use of alcohol or carbonated waters; avoid even water. Ice internally may do good by contracting the

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stomach; its direct influence on the bleeding vessels can be but trifling. Ergot preparations may be employed under the skin. It is desirable to keep the stomach contracted by a heavy ice-bag, which acts both by its weight and its temperature. The body must be kept at rest, recumbent; if any food be permitted, that will be iced milk in small quantities. Bismuth subnitrate is probably the only thing which is both tolerated and useful. Rest can be procured both to mind and circulation through the hypodermic use of morphia.

Cancer of the stomach, both near the pylorus and on the wall of the organ, has more indication than successes. We shall hear to-night of what surgery feels like doing, and in quite a number of instances has succeeded in doing, for cases the nature of which could be exactly diagnosed by the presence of a perceptible tumor, by decrease of strength and weight, scantiness of urine, etc. May be we shall even be told that ulceration and severe hemorrhages demand and permit surgical interference. Before that, however, there will be other indications. Loss of appetite may be benefited by bitters, nux, calumba, and, best of all, cundurango. Anæmia requires mild preparations of iron; constipation, a vegetable purgative, but no saline; pain, morphia internally or subcutaneously, but no chloral hydrate, which must be avoided in all conditions of irritability; eructation, charcoal or creosote; vomiting, morphia, creosote, hydrochloric acid.

Can we do more than simply treat the secondary symptoms? To a certain extent we can. A hundred cases of *carcinoma* which have come under my observation within these five years convince me of the efficiency of methylene blue. There are but very few patients but, if we commence giving small doses, say one to two grains daily, tolerate it well, and very few but are relieved and improved by it. I am not the only observer who has seen large tumors in any part of the body reduced in size by it, and smaller ones rendered almost imperceptible. If we cannot preserve life to three-score and ten, we can prolong it.

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ULCERS of the stomach, both acute and chronic, are frequent at every age. There are those whose experience permits them to say that from two to five per cent. of the population suffer from it (Ewald). Brinton collected 226 cases, of which two were under ten years of age; eighteen from ten to twenty; forty-three from twenty to thirty; thirty-eight from thirty to forty; thirty-eight from forty to fifty; thirty-two from fifty to sixty; and thirty-two from sixty to seventy. Similar results are obtained by Cruveilhier and by Rokitansky, who was the first to give an accurate description of the condition.

A late case has been published by Immerwohl (*Archiv. f. Kind.*, Vol. 43, p. 321, 1906). The patient was four year old, had a chronic ulcer and nephritis, and died of uremia.

These figures do not cover the case at all. Ulcer of the stomach, and the most dangerous form at that, is not infrequent in the infant. Between the seventh and the thirteenth year it is not at all rare. Fatal hemorrhage, the so-called melaena of the newborn, has been seen by most of you. Of Collins' 279 ulcer cases, seven occurred in the first year; forty-two below the tenth. The causes may be various. Prenatal defect in the wall of the stomach accounts for very few only. Thrombosis of the umbilical vein and embolism of small vessels, some of them depending on congenital affections of the heart, explain many. Local injuries by swallowed bones, needles and caustics, now and then hot food, give rise to the most acute forms, with fatal or nearly fatal results. In advanced years it is chronic gastric catarrh that leads to the vast majority of cases. It is these that you mostly see. To the *Festschrift* dedicated to me seven years ago when I was younger, on the completion of my seventieth year, Kinnicutt contributed

an article in which he spoke of the causation of gastric and duodenal ulcer by burns and by septicemia, particularly in those instances which are complicated with nephritis, the frequency of which is mostly found at the two termini of life—viz., soon after birth and in old age.

In connection with that statement, it will perhaps interest some of my hearers to be reminded that exactly eleven years ago, in the *New York Medical Journal*, I directed the attention of the medical public to the large number of cases of nephritis in the newborn, and that not a few discoverers of the last few years, whose literary knowledge does not antedate the year in which they are writing, have come to the conclusion that the very young infant is forward enough now and then to indulge in nephritis.

The living mucous membrane of the stomach is very liable to swell rapidly and extensively. An acute gastric catarrh raises the membrane in folds which adjoin and compress each other, similar to what may be observed in the lower part of the rectum, though its varicosities may not amount to what is called hemorrhoids. In these folds small fissures or ulcerations are often found as the results of the mutual pressure of the softened surfaces which are deprived of their epithelium. The stomach and intestine are very amenable to all sorts of detrimental influences. I remind you of the gastric and intestinal ulcerations caused by corrosive sublimate, arsenic, and baryum salts, though they be administered under the skin, and of the influence of the toxins of nephritis just mentioned.

Disorders of the circulation, mainly heart disease—both endocardial and myocardial, also arteriosclerosis, fatty degeneration of the intima, and hyaline degenerations of the arteries—conditions which are found in the vessels of the stomach as well as in the rest of the body—causing indigestion and fermentation quite frequently before actual heart diseases are diagnosticable—may cause ulcer in advanced life. So do cerebral or peripherious lesions of the nervous system. Von Yzeren (*Z. f. Klin. Med.*, Vol. 43) noticed ulcer of the stomach as the result of a section below the diaphragm of the pneumogastric nerve, and explained it by a spasm causing anemia.

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Ophüls (*Jour. of Exper. Med.*, Vol. viii, p. 182) made the same observation, but does not charge the origin of ulcer to any trophic influences of the pneumogastric, which are denied, but to the lowering of the motility of the stomach which is dilated by food pressure. Indeed, many clinicians like Ad. Schmidt believe that motor disturbances are at least as important causative forces as disorders of secretion or direct injuries. Defects in the epithelium amounting to slight wounds must occur very frequently in the healthy stomach, but the normal mucous membrane covers a slight wound at once and excludes the gastric acid; only in atonic and anemic conditions of young women such a rapid recovery would not take place and the recent wound not heal.

Von Yzeren, whom I have mentioned, suggests also the possibility of explaining the gastric ulcer by a trophic influence of the pneumogastric nerve on the gastric mucous membrane, and alludes to the frequency of ulcer in the same family which may point to abnormal innervation. Similarly Dalla Vedova (*Arch. d. Verdauungs K.* viii) caused gastric ulcer by the irritation and section of the coeliac plexus, which moreover contains pneumogastric fibres, and claims it as a trophoneurosis like a mal perforant. This experimental fact explains the fact that there are families in which there appears to be an hereditary tendency to gastric ulcer. This hereditary influence does not appear to be widely known or appreciated, but Rütimyer has given it prominence in a book published in 1906 on "The Geographical Distribution and the Diagnosis of Gastric Ulcer"; and Armin Huber in a paper on the same subject published in the *Münchener med. Woch.* of January 29, 1907.

It would be a grave mistake, however, to exclude all the other etiologic factors. Huber makes that mistake. Indeed the disturbances of the complicated physiology of an organism (that means an organic disease) has more, and more complicated, causes than an infectious disease whose main or only cause is a microbe.

All such cases are liable to be very obstinate and to show a predilection for certain areas. It is principally the neigh-

borhood of the cardia, and next to it that of the pylorus, in which an ulcer, single or multiple, is located. It is the latter, the ulcer near the pylorus, that may result in the thickening of the surrounding tissue. It may amount to a tumor which is sometimes diagnosticable, mostly on the left side, though it do not amount to a malignant degeneration. I may be permitted to add here that carcinoma will sometimes develop out of and near an ulceration, or from its cicatrix—though the assertion that gastric ulcer will develop into carcinoma in as many as three per cent. of the cases is an exaggeration. From what I shall have to say you will easily concur with me when you consider that such statements are apt to come from those whose horizon is influenced by the fact that they count their cases by the results of their autopsies, both on the living and the dead.

Most ulcers are found on the posterior wall near or in the small curvature; the next locality of predilection is the neighborhood of the pylorus. Some are found near the cardia and in the fundus, in the anterior wall and the large curvature. When ulcers are in the duodenum and the pylorus they may merge and cause a gastro-duodenal fistula. Recent ulcers and old cicatrices may be met with together. The size may be no larger than the head of a pin and then detected with difficulty at the autopsy; there are, however, those of the size of the hand. Secondary peritonitis, duodenitis, abscesses in the wall of the stomach, in the liver, and perforations into the peritoneal cavity, the liver, the spleen, the subphrenic space, and the pleural cavity may occur. The locality and the size of a cicatrix may give rise to changes in the shape of the stomach. Besides dilatation and muscular hypertrophy which results from ulcers near the pylorus terminating in stenosis, the center of the organ may contract and form a bilobular stomach, or hour-glass constriction.¹

Or the small curvature may contract so that cardia and pylorus approach one another; or diverticula may occur. (E. Kaufmann, *Path. Anat.* 3 Ed., p. 389.)

¹ In this connection—the hour-glass constriction of the stomach—of an ante-natal kind probably *also* the result of an inflammatory process—may be mentioned. There is a case of J.

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Hemorrhage. Brinton, Gerhardt, and Welch believe it occurs in from three to five per cent. of all cases; Müller, in ten per cent.; Leube, in less than one per cent. This latter statement corresponds with my own observation, which extends over fifty-four years of private and hospital practice in New York. Blood may be vomited or passed down. Hemoglobin will easily be changed into hematin. That is what changes the color. When there is much acid in the stomach, coagula will be brought up. The acid and the presence of gases in the gut give it the tar color we meet in the stools. Slight hemorrhages may take place for weeks and months, without vomiting. Small quantities of black blood may be found in the feces, sometimes daily. Their presence must be suspected when persons suffering from gastric symptoms become thoroughly anemic. Still, in such cases great caution should prevail, for menstruation or swallowed meat particles, or slight extravasation—mostly red, however—from rectal varicosities may simulate occult gastric bleeding. Besides, there may be extravasations from varicosities of the esophagus, from slight hemorrhagic erosions, or from disturbances of the portal circulation. And it should be borne in mind that the presence of hemoglobin and red blood-cells by themselves in the masses brought up by vomiting or evacuated from the rectum prove nothing at all. Unobserved bleeding from the gums or the posterior nares or the throat, must not be taken for a gastric ulcer. Even in what is called melaena of the newborn, mistakes may be made. A wise man has written a book lately to explain all the cases of malaena on the strength of one case of vomiting and expelling blood which could be proven to come from the posterior nares.

The detection of blood is sometimes very difficult. The Tinct. guaiac and turpentine test teaches the presence of fair quantities of blood only. The arteries from which H. Musser, (*Phil. Med. Times* xiv. 331, 1883) Dwight, (*Amer. Jour. Med. Science*, vol. 126, 581, 1903) K. Sievers (*Berl. M. W.* 36, 325, 1899)—Possibly, however, such a case means nothing but an atavistic return to the condition of some animals (Ballantyne II, p. 533, Ante-natal pathology).

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hemorrhages take place are the coronary—mainly the superior—also the splenic and gastro-intestinal. If it be the coronary, the bleeding may come from both sides. Hemorrhages from a vein, or from an artery *and* a vein at the same time, or from a neighboring vein—for instance, the splenic—are quite rare.

Perforations are grave accidents. Gerhardt, Debove, and Rémond claim their occurrence in thirteen; Lébert and Welch in from three to six; and Leube in one and two-tenths per cent. of all their cases. The latter percentage I think to be correct, unless you count the gravest cases only.

Mortality reports vary widely. Leube has two and four-tenths per cent. of his 424 patients. There were recoveries after four to five weeks in seventy-five per cent.; improvements, twenty per cent.; failures, one and five-tenths per cent.; deaths, two and four-tenths per cent.

Let me ask at once what a recovery in four or five weeks may mean, and where is the guarantee of the persistence of his results?

Debove and Rémond report fifty per cent. Leube's figures rise from two and four-tenths to four and one-tenth per cent. in cases of hemorrhage. Koehler has a mortality of six and four-tenths; Warren of ten; Welch of fifteen; Habershon of eighteen per cent. Warren collated 127 cases; thirty-four per cent. of them attained a complete recovery; there were relapses in forty-three per cent.—indeed, relapses are reported by all authors, and are experienced by Russell and Joslin, and by all of us. He found carcinomatous degenerations in three per cent.; stenosis of the pylorus in ten per cent.; and death from hemorrhage and perforation in ten per cent. Schulz had permanent recoveries in sixty-four per cent.; temporary recoveries in twelve per cent.; and failures and death in twenty-three per cent.

All these figures and many more are collected by Lieblein and Hilgenreiner in the forty-sixth volume of Billroth and Luecke's *Deutsche Chirurgie*, which treats in its 600 pages of the ulcerations and the acquired fistulae of the gastro-intestinal tract.

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The vast differences, two and four-tenths per cent. and fifty per cent., prove for the thousandth time that statistics may be the most deceptive and most irrational method of dealing with any clinical question. The experience of the general practitioner in a large practice amongst the poor, or amongst the rich, or amongst men or amongst women; the general physician with a family practice only, or an office practice pre-eminently; the consultant who is called in to see bad cases only; the stomach specialist; the surgeon in general practice; the hospital physician in whose wards bad cases only take refuge; the hospital surgeon who never sees anything but hemorrhages and perforations—what a variety of good observers, but also what a variety of cases, and durations, and causes, and observations! Exclusive hospital physicians and surgeons have no experience with the average ulcer of the stomach—theirs is only an experience of bad or of fatal cases. Their statistics refer to hemorrhages and perforations, but not to chronic ulcer of the stomach, which in almost every case is a disease of slow development, chronic in its nature, amenable to dietetic and drug treatment, part of the domain of the general practitioner and influenced by general therapeutic methods, the last stage of which, in a few cases comparatively, may, or rather will, be an operation. That operation in these few cases should, if possible, be performed by the man who has often done it. I know of a big hospital in which the operation for perforation of the gastro-intestinal tract is frequently performed successfully by the surgeons, unsuccessfully by the adjunct—a significant fact.

The most reliable statistics of chronic ulcer of the stomach could or should be established by one hundred or five hundred general practitioners, provided they keep records of their cases. They see them in the beginning, when the symptoms are those of dyspepsia, hyperacidity, and pain only; they see the advanced cases which have been neglected by the factory girl who is compelled to work ten or twelve hours to make a living, by the business man, the mechanic, the working man, also the worst class—the so-called acute cases of hemorrhage or perforation. Collected

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in large numbers, they give reliable statistical data—but in large numbers only.

The main symptoms of gastric ulcer are pain, hyperacidity, and sometimes hemorrhage.

The *pain* is caused by over-secretion, by undue peristalsis, or by pressure. There are few cases without it. It is almost always local, most intense when the ulcer is in the pyloric region—usually, however, it is found in the median line a little below the ensiform process. Pressure will always elicit it. It is rarely mild, usually marked. An empty stomach is not, as a rule, sensitive spontaneously—that means without pressure. The pain starts at once during eating, and increases during the activity of digestion, and is diagnosticated from a neurotic pain by (in the latter) the sensitiveness of the empty stomach, which is relieved by eating. Gastric neurosis is relieved by frequent though small meals.

The pain of gastric ulcer is often transmitted to the back, not opposite to the precordial region only, but also to the dorsal area and apparently to the lungs, also to the region of the deltoid and the inner aspect of the humerus. When it has healed, it is no longer painful; cicatrices are not sensitive. It should not be forgotten, however, that pain does not always mean ulcer, but that many a pain of seeming gastric ulcer may be called forth by a cold temperature (ice water or atmosphere), or by emotions. Usually, however, it is a meal that provokes it. A pain which arises regularly from two to four hours after a meal should be referred to the colon, which then is in a condition of chronic inflammation and often dilatation, and exhibits obstinate constipation. Pain arising half an hour after eating is due to duodenal ulceration or to peritonitic adhesions.

Hyperacidity. In its normal condition the gastric secretion has twenty-five one-hundredth ($\frac{1}{4}$) per cent. of hydrochloric acid. It has no injurious influence on the living tissue, which contains in its living blood-vessel circulation a sufficient quantity of alkali. When tissue is broken down, however, that means ulcerates, the vital equilibrium between alkali and acid is disturbed, and the presence of even the normal quantity of gastric acid adds to the le-

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sion.² That takes place in the normal condition of the gastric secretion. But during the presence of an ulcer—mainly when near the pylorus with consecutive functional or organic stenosis, the acid rises to three-tenths or five-tenths, or even six-tenths of one per cent. In uncomplicated gastric ulcer there is no lactic acid. In this respect it differs from carcinoma—which has almost always lactic and usually no hydrochloric acid. This reduction, or absence, is more frequent in cancer than in any other disease. The reduction is noticed in one-third, the absence in two-thirds of the cases, no matter in what part of the stomach the malignant change may occur. (Benj. Moore, Liverpool, *Proc. Royal So.*, 1905, vol. 76; *Biochem Journ.* 1906, I. p. 274; W. M. Palmer, *Biochem. Jour* I. 398). The blood appears to contain less free hydrogen ions for the gastric cells to secrete in the form of free acid. It has also been observed that in cancer the alkalinity of the inorganic constituents of the plasma is increased. Exceptional cases, however, tell a different story. A few weeks ago Dr. Willy Meyer exhibited a specimen of pyloric and gastric ulcer of large size, taken from a patient whose examination before the operation yielded absolutely no lactic but large amounts of hydrochloric acid in the gastric secretion. This hyperacidity, however, may be entirely absent—there may be anacidity. The latter condition may accompany cases of dilatation of the stomach which depend on consecutive stricture of the pylorus.

As long as there is the usual form of gastric ulcer and when no decomposition of the gastric contents takes place, digestion is possible, sometimes even normal. Secretin is formed by the action of hydrochloric acid on the mucous membrane of the duodenum. Even without secretin, in cases of achylia gastrica the trypsin of the pancreas digests proteids in an alkaline surrounding—like pepsine in

² The same destruction may take place after death when the circulation is gone and the acid is still present. In that condition, the so-called gastro-malacia—the softening of the stomach—is frequently observed. Until Elsaesser's time, 1848, it was considered a disease of the living. It was he who explained it by the corrosion of the dead tissue by the still present acid.

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an acid. After a while, however, the digestion is, or may become, impaired on account of motory incompetency, or of acetic, butyric, caprylic, and all sorts of fat acids accompanying the hydrochloric. Together they give rise to sour eructations which either begin with eating or follow the meal for an indefinite time, and annoy the patient sometimes all day. Attacks of sour vomiting will be observed during a meal or within one or two hours afterwards.³

Hyperacidity is not a constant accompaniment of gastric ulcer, but as a rule it must be looked for. In cases of chlorosis it is common; in them the alkalinity of the blood is diminished. Acid exerts its local influence when it meets with an occasional lesion, mostly traumatic, of the gastric mucous membrane—mainly when the latter is in a condition of ill-nutrition or atrophy. I may repeat here that the acid found is not invariably, as Ewald asserted, hydrochloric, but often a fat acid. R. F. Chase (*Boston Med. Jour.* No. 2, 1907) thinks that such an occurrence indicates a change of treatment. It does not.

Complicating symptoms have been enumerated.

Glucose. It has no direct connection with gastric ulcer, but with a complication of pancreatic disease.

The leukocytosis of digestion is always absent in carcinoma of the stomach, but it may also be absent in gastric ulcer. Blood examinations are of no account for the differentiation between ulcer and carcinoma.

Spasm of the pylorus is noticed only when the ulceration is in close proximity to it.

Splenitis has been observed by Gerhardt.

The urine is often scanty, of high specific gravity, and may contain diacetic acid and acetone. An ominous symptom is its alkalinity and the absence of sodium chlorid, provided that alkalinity be not the result of medication.

The diagnosis may become difficult or complicated by the secondary appearance of chronic or subacute peritonitis and adhesions.

³ Both pain and vomiting, repeated and persistent for months, may be occasioned by the local pressure exerted by a floating right kidney. This is important to remember for the purpose of a differential diagnosis.

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What I have said of the influence of the gastric acid on the causation and perpetuation of gastric ulcer, teaches the indication for treatment.

Absolute rest in bed from two to three weeks in acute cases should be a prerequisite. But the large majority of patients are young, ill-fed, sometimes chlorotic—working women, who will apply to you only after they have suffered months or years. Here is your difficulty, as it has been mine in hundreds of cases, and here, quite frequently, the cause of the gravity of the prognosis.

The moderation of heart diseases and the combating of a chronic gastric catarrh act as preventives. The presence of ulcer requires constant alkalinization of the stomach. I say the constant alkalinization, for the administration of an alkali at long intervals is insufficient. I give an alkali before every meal, and at intervals of two hours—not for weeks but for months, in sufficient quantities. Boas, an authority on many questions relating to the stomach, found that the presence of gastric juice with its three per mille of hydrochloric acid, requires twelve grammes (5 iii) of sodium bicarbonate for neutralization. That is why lime water which contains only one part of lime in 780 parts of water has hardly any claim as a neutralizing alkali. The two hundred cubic centimeters of aq. calcis recommended by Norbert Ortner contain twenty-five centigrammes (equals four grains) of calcium.

Which alkali should be preferred? As a rule, those which contain no carbonic acid. Carbonic acid inflates the stomach and does it suddenly—a dangerous result in the imminence or presence of a hemorrhage, and increases peristalsis. That is why sodium bicarbonate, and even calcium carbonate, should be avoided. But it is not always possible to do so. The best is calcined magnesia, magnesium oxid. Three to four grammes are easily taken day after day without causing diarrhea; some may take more daily in (refracted) two-hourly doses. When more alkali is required, the addition of prepared chalk cannot be avoided. Calcium phosphate *may* take its place, but is not an equivalent. Bismuthus subcarbonate—not *subnitrate*—on account of its crystalline gritty condition, may safely and efficiently

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be added in a daily quantity of from two to ten grammes. One of its accessory effects is the suppression of diarrhea. Magnesium oxid is clinically analogous to calcium oxid, but is not caustic because it is almost insoluble in water. As it is readily dissolved in acids, it neutralizes them in poisoning cases better than the carbonates of calcium or magnesium, the calcium dioxid of which when rapidly developed will annoy the stomach or diaphragm and cause peristalsis. The oxid of magnesium should be given suspended in from 100 to 200 parts of water. If too little water be used, magnesium hydrate may stiffen into a gelatinous hard mass; even intestinal conglomerates may form, consisting of ammonio-magnesium phosphate.

Diarrhea should be avoided, and the daily dose of magnesium oxid must be guided by the purgative effect its administration will or may exhibit. The danger of diarrhea forbids the use of calomel; the Carlsbad water or salts which have been urged as frequent indications should be given with a great deal of mental reservation.

Bismuth is not absorbed by the intact mucous membrane. When this is deprived of its epithelium, bismuth may lead to central convulsions and local inflammation, like that caused by mercury, of the organs of elimination. Nephritis, stomatitis, and colitis have been observed. Large doses which do not meet a sufficient amount of sulphid of hydrogen may be expelled through the rectum unchanged.

Anesthesin and orthoform have been recommended in place of other bismuth preparations. They benefit the manufacturers if nobody else.

Excessive peristalsis must be avoided both in mild and bad cases. The equivalent of from ten to fifteen milligrammes of opium to every powder (opium, extract of opium, codcin, morphin) relieves pain and reduces peristalsis. Opium, however, is said by some to increase the secretion of acid. I have not been able to convince myself of that effect. In its place and for its alleged effect of relieving acid atropin 0.001 has been used subcutaneously once or three times a day. Both the administration and the dose have their inconveniences. Belladonna, the herb or the extract, has been given internally in doses of 0.03

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several times daily. There are very few patients, however, who tolerate 0.1 of extract of belladonna for days in succession. As a rule, four or six centigrammes in successive days is all that can conveniently be given to adults. Children and infants tolerate large quantities in proportion.

Chloral must not be tried as a substance for an opiate. It is a local irritant. I emphasize that because I have met with the advice to use it.

Very severe pain may require an occasional subcutaneous administration of morphine. In many cases it may be overcome by hot applications, either dry or moist; in many more, by obliging the patient to swallow a big dose of calsined magnesia, with or without bismuth, and lie on his face and belly in order to facilitate the contact of the alkali with the sore and sensitive surface. When the ulcer is near the pylorus, the posture on the right side may be preferred. It is rational to recommend a gradual change from one position to another. With chloroform water given in this condition, I have no acquaintance; it has been recommended in doses of from 150 to 200 cubic centimeters. Six ounces, however, is a rather big dose for that kind of stomach. When a severe pain has been attributed to spasm of the pylorus, some ounces of olive oil have been administered. I prefer alkaline and narcotic treatment.

To avoid peristalsis, no food must be cold, and the powders must be taken in warm or hot water.

The treatment must be continued for a long time—not weeks but months; no matter whether the case presents itself in an acute form or, as usual, in its slow development from an acute or chronic gastric catarrh. The alkaline and cautious dietary treatment will keep the operating specialist comparatively idle, but should follow operative procedures as well. Magnesia will be borne by the mucous membrane better than the normal acid—after operations also. An open ulcer or a mere sore when exposed to the normal acid of the stomach will get worse and may perforate. Bismuth alone is insufficient.

In hemorrhage or perforation absolute rest must be enforced. Both require morphine subcutaneously. Adrenalin internally was never of any use in my experience.

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Give it under the skin, it acts better than ergot. In bad cases it is worth while to try the effect of ligating the venous circulation of the lower extremities as you do in pulmonary hemorrhages. Lead has served me badly. Two hundred cubic centimeters of a five or ten per cent. solution of gelatine have been recommended. One objection to the dose would be its bulk.

Ice bags are indispensable in hemorrhages. Subcutaneous saline infusion may become necessary to relieve collapse, but the amounts of blood are often overestimated, on account of the large quantities of saliva and serum mixed in.

Louis Bourget of Lausanne, in a book published in 1906, is more optimistic in regard to local treatment of gastric hemorrhages than I or others have ever been. I am very anxious to avoid the stomach tube for obvious reasons, sometimes because I am afraid of removing the clot which may already cover the bleeding ulcer; mainly when the sore is near the cardia. Bourget does not *fear*; he advises the introduction of a soft tube. After emptying the stomach he introduces one hundred cubic centimeters of a one per cent. solution of iron sesquichloride. It is removed and replaced by a new injection. This is repeated four or five times until the liquid returns clear. The same procedure is continued for four or five days. In rare cases he allows the patients to drink the fluid and then turns them on their faces.

Protracted cases—that is those which relapse from time to time—almost always through the fault of ill-behaving patients—require in addition to the above treatment silver nitrate, fifteen milligrammes in a tablespoonful of distilled water three times a day, two hours after a meal. That administration is to be continued a month, discontinued a while for fear of argyria, and perhaps begun again. It may be given in a pill. The quantity I do not exceed in a month is one and five-tenths grammes. It has been stated that thirty grammes will cause argyria. With the care I have been in the habit of taking, it should not be feared. I have seen two cases of my own, but none these thirty years. Silver nitrate has been credited with neutral-

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izing hydrochloric acid by throwing down the chlorid. As this is inert, I see no advantage in giving it on account of such an indication; that aim is more readily reached by an alkali.

Iron should not often be given in the anemia of gastric ulcer. I prefer to look for occult hemorrhage, and to give such food as the ulcerated stomach may aid in changing into blood and tissue. Give no proprietary iron preparations. Chemists and druggists may be gentlemen, but their labels introducing them as "representatives" or "M. D.'s" may be deceptive. I claim the benefit of the doubt and refuse to admit them. Ferratin, the lactate, and the carbonated iron of the Pharmacopeia should be selected when iron is to be used after convalescence has been established.

Albuminates of iron are tolerated by many. Ewald prepares a two or three per cent. dilution of iron sesquichloride in water; one teaspoonful of this is given three times a day in a wineglass of egg water. This means one white of egg in two parts of water.

Dietetic treatment of ulcer of the stomach, or rather of patients suffering from ulcer, is as follows:

Leube demands rest for both body and stomach. Patient is in bed, has hot fomentations on his precordia, ice during a hemorrhage. The diet is restricted. For ten days he has boiled milk, bouillon, Zweiback; the week following, rice, sago in milk, raw or soft-boiled egg, calf's brain, sweetbreads. Five more days, scraped raw ham, scraped beef, boiled calf's foot, some coffee and tea, mashed potatoes. Seven more days, rare roast beef, broiled chicken, macaroni, some little bread. A gradual return to general diet. Leube lives in Würzburg. Leuhartz, who lives in Hamburg, where they eat well and plenty, calls the above diet underfeeding; on the principle that "anemia and hyperacidity are predisposing causes of ulcer and retard the patient's recovery," the patient has immediately, even after a hemorrhage, a concentrated albuminous diet of milk and raw eggs with sugar, so that after two weeks 3,000 calories are taken; on the sixth day, chopped meat; on the seventh, rice; on the tenth, raw ham and butter, in addition to the above.

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Senator nourishes without overloading by gelatine, cream, frozen butterballs, and sugar.

Schmidt, in *D. Med. Woch.* Nov. 22, 1906, claims that Leubhartz is correct and Leube is correct, but Leube should add eggs, gelatine, butter, cream, sugar, and rice. He also says that chopped meat and scraped ham should be given "only with caution." I prefer caution both to chopped meat and scraped ham. Neglect caution once and you lose the game, for a time at least.

What I prefer is as follows: No solid food of any kind for weeks. Milk in any shape—raw in the country, if reliable; always boiled in the city and preserved rationally. Buttermilk, sour milk, are well tolerated by most patients. The doses must be small, in frequent intervals—that means five or six meals a day. Milk must not be drunk like water—to prevent hard eaking in the stomach; let it be poured into a plate and eaten with a spoon—from two or four quarts in twenty-four hours. Patients may have stale bread—toasted or not. They should eat it mostly without moistening. Normal saliva is alkaline—only slightly acid in dyspepsia and feverish conditions, in diabetes, etc. They may also have rice, powdered, immersed in water for hours, and slowly boiled in water, and finally in milk. Rice water or barley water may be admixed to this milk for people who have to get accustomed to taking milk. Now and then you hear of such as say they cannot and will not take milk. Let them try starvation—they will soon be enlightened and converted. On three quarts of milk and a pound of dry bread they will thrive and gain pounds of weight every month. Somatose, tropon, sanatogen, have been recommended for alleged or obvious reasons. Milk may be peptonized for those who prefer it.

The preparation of milk with hydrochloric acid, which I learned from Dr. J. Rudisch nearly forty years ago, and have often described—that is one part of dilute hydrochloric acid in 250 parts of water; which then is slightly boiled with one quart of milk (500 parts)—a process which permits milk to coagulate in thin floccules and is easily borne by invalids, is perhaps not so appropriate here on account of its containing or forming sodium chloride in ex-

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cess. Sodium chloride, which I recommend as a regular addition to cow's milk under ordinary circumstances, should not be used in gastric ulcer. Bourget is wrong when he recommends it. It *will* form HCl.

Whenever anemia is excessive and hyperacidity (no matter of what nature) is present, egg (mainly the white) is tolerated. Even during bloody vomiting which threatens inanition, tablespoonful doses of iced milk and occasional doses of raw egg albumin, frozen, may be tried.

Nutritive enemata may be required. Ewald beats two or three eggs with a tablespoonful of cold water; then he boils a small teaspoonful of starch with half a cup of twenty per cent. solution of grape sugar, to which is added a wineglassful of claret. To this he adds slowly the egg mixture; which must not be too hot. Before injecting, he washes the rectum. The enema may amount to 250 cubic centimeters.

A year ago I was present when a famous clinical teacher of the West delivered an elaborate address on gastric ulcer as a "surgical disease." I took it that he spoke of the affection as he sees it in his hospital wards only, and of the most acute attacks with hemorrhage or perforation. I feel positive from what I have said of its frequency in general practice and of the long time it takes negligent or indigent patients to nurse their illness up into the stages of hemorrhage or perforation you will admit—those of you who are or have been in general practice amongst all classes, mainly the poor or not well-to-do—that you see it often, treat it often, cure it often, and prevent it from getting into a medical or a surgical hospital ward, there to be used by a diligent and punctilious recorder and the attending staff as material for deceptive statistics.

But you may have relapses and meet with obstinate cases, and those which bleed or perforate. Indeed, we should not claim a recovery when the symptoms have abated after four or five weeks. In that respect even Leube commits mistakes when he reports 424 cases, of which seventy-five per cent. recovered after four or five weeks; twenty per cent. improved; one and one-half per cent. remained unimproved; and two and four-tenths per cent. terminated in death.

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Conservative surgeons are not, however, of the opinion of my clinical friend. They readily admit that seventy-five per cent. of gastric ulcers are cured by internal treatment. Both Warren (*Boston Med. Journal*, Nov. 13, Vol. 89, 1899), and Krönlein (*Arch. f. Klin. Chir.* vii. 79) agree on that point.

Warren reports on one hundred and eighty-seven cases. Permanent results could be obtained in one hundred and twenty-five; complete recovery took place in thirty-four and four-tenths per cent.; relapses in forty-three and two-tenths per cent.; carcinoma developed in two and four-tenths per cent.; stenosis of the pylorus and dilatation of the stomach in ten and four-tenths per cent.; death caused by perforation in four and eight-tenths, and by hemorrhage in four and eight-tenths per cent.

Krönlein says that seventy-five per cent. of gastric ulcers heal under nonoperative treatment. The mortality of the other twenty-five per cent. is from ten to thirteen per cent. He reports on eighty-five operations, the method being no longer excision, as formerly, but gastroenterostomy. The immediate losses after operation are from eight to ten per cent. Final results of eighty-five operations: recoveries sixty-one per cent.; improvements, twenty-four per cent.; secondary carcinoma, three per cent.

Dilatation of the stomach recovers very gradually, the secretion becomes normal, with the exception of a few cases in which HCl was not secreted when it had not been present before the operation. In his opinion no operation should be made early. His indications are stenosis and dilatation, also hemorrhage.

In a very brief paper, published in the *N. Y. Med. Monatsschrift*, Sept., 1906, A. J. Ochsner claims that the indication for operative interference, for those cases in which no other treatment proved successful are stenosis, dilatation of the stomach and occasionally hemorrhage.

For him the difficulty of obtaining satisfactory statistics is the result of several factors: a patient changes his doctor in the course of a protracted disease; the doctor counts his own good cases, also the failures of the surgeon. The surgeon loses sight of his case, which returns to the prac-

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titioner, or to some other surgeon. Altogether Ochsner knows of the occurrence of a large number of cases that never see a surgeon.

The results of the operations depend on the method, to a large extent. Marco Donali (Turin, 1905) published a statistical review of 1,041 gastric operations. The resection of the ulcer furnished twenty-one and four-tenths per cent. of deaths, and so many relapses that the failures amounted to thirty-five and seven-tenths per cent. Gastroenterostomy reduced the percentage of deaths to fourteen and fifty-six one-hundredths per cent. That is still too many.

The surgeons I mentioned above are no mere operators, and therefore, conservative. They are the representatives of a class which we hope will become more numerous—that class which is no longer bent upon splitting medicine into lifeless parts, but consists of physicians who add to diagnostic powers and therapeutic knowledge unusual dexterity. There is one thing they are not doing. These surgeons do not speak of Thiosinamin or fibrolysin which have been recommended for the absorption of all sorts of unabsorbable tissues—for esophageal stricture, pyloric cicatrices, and gastro-intestinal adhesions. Thiosinamin two decigrammes has been administered subcutaneously in a ten or twenty per cent. glycerine and water solution every two or three days. The injection causes pain. Its combination with sodium salicylate is called fibrolysin and is not so painful. That is probably the only difference. If they could do all that is claimed for them, there might be a panacea for all sorts of connective tissue hyperplasia in tabes, chronic nephritis, cirrhosis of the liver, chronic peritonitis, and meningitis. *Credat Judæus Apella.*

We shall readily agree that stenosis of the pylorus, and gastrectasia, and ulcer not improved by rest and diet and medication should undergo operation; we admit that the indication for operation in hemorrhage or perforation may seem urgent to one and quite doubtful to another, for it is a fact that many die without an operation, many get well without an operation, though its performance seemed urgent, many die after an operation, in spite of it or because

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of it. It is in such cases that responsibility lies heavy on one's soul, and remorse or reproach, as the case may be, may not die out for a long time. Such are the dangers and the vicissitudes of the war against disease.

Finally, a word of warning. We are not in different camps. The question of internal or of external treatment is no partisan affair. We are all physicians with common aims. To the class of absolutely positive indications for operative interference, we add a number of cases that offer difficulties to the most honest and experienced judgment. In such cases the old proverb should not be forgotten: "*Anceps remedium melius nullo*,"—a doubtful remedy is better than none at all. But after the operator has performed his welcome duty, the case is again yours—the practitioner's. After the operation you may have an organ of doubtful utility. The creation of a funnel is not the restoration of a normal stomach. The patient requires careful supervision of his diet, and may require medication. Hyperacidity may require alkali a long time. Some of our surgeons—I rather feel like saying, too many—are often satisfied with a temporary success. That is why your stomachs may not remain well—why your uteri do not really recover, why your adenoids relapse. These are the cases in which the conscientious skill and the modest patience of the practitioner has to accomplish the final and permanent cure of the patient who has been temporarily relieved by a brilliant achievement—by means of supervising the daily habits and diet, and the local and general circulation, and by hygienic and medicinal preventives. No trumpets tell our glory; that tedious care looks like a humdrum annoyance to the patient, but it saves him from relapses and undertakers.

THE DISINFECTION OF THE ALIMENTARY CANAL

WHEN considering the alimentary canal from any point of view pathological or therapeutical, we should begin by paying particular attention to the mouth. It is mainly endangered in the very young, and most of all in the newly born.

There are several reasons (mostly discussed by Rudolph Fischl, in *Volkman's Clinical Lectures*, No. 220) why microbes of so little virulence as not to prove dangerous to the adult should be fatal to the newborn. It is true the phagocytic reaction is but trifling in the newborn, his blood is less alkaline, there is but little tendency to fever, and his lymph nodes do not respond much to inflammatory irritation. However, some such protections of the adult as expectoration or perspiration are absent; that is why the intestines and the kidneys are the only eliminators. The hard part of the epidermis of the newly born is not developed, according to Hulot; the epithelia are still of an embryonal character, and there is a copious normal desquamation of all the integuments, both cutaneous and mucous. Thus, between the injured or partly lost epithelia ample admission is secured to the nomadic tribes of untold microbes. That is particularly so in the prematurely born, whose tissues are still more of the embryonal type than those of the mature fœtus. Thus it may happen that some of the pyogenous cocci which are known to occur in normal vaginal mucus suffice to infect a newborn. Not the least additional factor in causing danger is the symbiosis of schizomycetæ with putrefaction microbes, whose co-operation becomes particularly manifest in the infections which originate either in the umbilicus or in the mouth.

The newborn and the infant are left to the care of

others; they cannot protect themselves. As they cannot expectorate, so they cannot gargle or wash. Their food when given hot injures the epithelia; their mouth is washed and rubbed sore with a coarse cloth, dipped in unsterilized water by unclean or septic fingers. Their very screaming, while pulling at the mucous membrane of the posterior part of the alveolar process, through traction of the pterygoid muscle, induces local anæmia and rupture and necrosis of the mucous tissue, and causes the "aphthæ of Bednar," which, according to Fränkel, frequently harbor staphylococcus citreus. Malformations of the mouth, such as cleft palate, add to the recesses in which bacteria may find a nest. The slightest abrasions occasion the development of thrush, the oidium of which is capable of entering the œsophagus and the stomach, also the brain, the spleen, and the kidneys. Food, air, and fingers carry into the mouth leptothrices, streptococci and staphylococci pyogenes, pneumococci, bacteria coli, and Klebs-Loeffler bacilli, which are absolutely harmless, with few exceptions, *as long as the surface of the oral cavity is normal*, but enter the lymph-circulation and the blood-circulation when a superficial lesion favors the admission of microbes. As long as no lesion takes place no amount of microbes establishes the diagnosis of an infectious disease. That is why our boards of health are apt to make mistakes and to shoot beyond the aim. For the responsibility they have in connection with the sanitary interests of the public is quite liable to carry them too far in depriving of their personal liberty those who, like many perhaps of us here, harbor any number of bacteria in their mouths without being sick. With the exception of what occurs in the tonsils on which the normal epithelia may be interrupted in their close juxtaposition, they do not enter the circulation unless there be hyperæmia, catarrh, or ulceration. Such stomatitis and pharyngitis were always considered a secondary symptom of an infectious disease; it is more probable, however, that they, particularly the adenoid organs, tonsils, etc., are the first to be infected and furnish the inlets of infection. That is mainly so, however, in later life, not in the earliest infancy; here the palatine tonsils are mostly still small

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and smooth, and are frequently and easily washed clean during swallowing. Later on, perhaps, influenza and measles, very likely scarlatina, rheumatism, and erysipelas may take their origin in the nasopharyngeal cavity. Cerebro-spinal and other meningitides are known to have been occasioned in this way. Puerperal fever in the newly born, osteomyelitis, and suppuration around a simple fracture have been observed under the same circumstances. In advancing years frequent repetitions of pharyngitis, deepening of the lacunæ, and fistulæ dating from previous abscesses give ample opportunities to invading microbes. During infancy, also during the diseases of advanced age, which are complicated with unconsciousness, such as apoplexy, typhoid fever, or pneumonia, remnants of food remain in the recesses of the mouth, disintegrate and lead to irritation, inflammation, and infection.

The œsophagus is not likely to be affected in a similar way. Still, twenty-five years ago I published the case of a small boy who had a stricture of the œsophagus from drinking lye. The autopsy revealed, besides fibrinous bronchitis, diphtheria of the cicatrix.

To prevent microbic invasions the mouth should be kept clean. It should be washed after every meal and at bedtime with water or with a mild solution of borax or boric acid. Those wearing artificial teeth should be particularly careful. A few drops of tincture of myrrh in a glass of water, or a solution of salicylic acid in 500 or 1000 parts of water, or a mild solution of permanganate of potassium (1 : 3000-4000) is quite satisfactory. The regular use of a soft tooth-brush or of a coarse cloth is fortunately a universal habit among clean people. The mouth of patients who are unconscious should be moistened at short intervals; the dry typhoid tongue touched once or twice a day with a 1 per cent. solution of nitrate of silver. The composition of tooth-powders should be known; those containing strong alkalies avoided.

The use of chlorate of potassium is advisable in any case of incipient stomatitis. A solution of 1 part in 50 of water is mostly sufficient. But the internal use is often preferable in established and progressive cases. To have

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a speedy effect, it should be taken at short intervals—every hour or every half hour; the dose should be held in the mouth a minute and slowly swallowed. The daily dose should not exceed four or five grammes for an adult; one gramme or less for an infant. If the latter is not to take it, a few drops of a 2 or 3 per cent. solution may be brushed on the mucous membrane. It should never be forgotten, however, that the persistent internal use of chlorate of potassium may prove dangerous. Since the first cases of poisoning I published in Gerhard's *Handbuch der Kinderkrankheiten* in 1876, and those reported by me to this Society in 1879, a great number of deaths from the same cause are known to have occurred.

Tiny infants unable or unwilling to clear their mouths of food remnants should be given a teaspoonful or more of water after a meal. Washing of the mouth, when considered necessary, should be done with great care, and not in the newborn only, for the reasons detailed before. No direct local application should be made to the throat; the force required for that purpose and the struggle on the part of the little ones make them at least very unadvisable. The best way to get at the throat is through the nose and nasopharynx, which are so often the seat of chronic catarrh, ulcerations, and adenoids in the very young. The regular irrigations with warm salt water made by means of a nasal cup (better than spoons, droppers, or syringes) are very beneficial. They clear the narrow cavities of mucus which cannot be otherwise removed and of foreign material which finds a ready access. Of that nature are tubercle and diphtheria bacilli, and saprophytes. One of our specialists objected some time ago to these preventive irrigations, for the reason of their alleged superfluity. He said that nobody irrigated the stomach regularly and as a matter of prevention; and what was objectionable in one cavity was so in others. He merely forgot that the stomach is not accessible to the atmosphere and the dust of the street; that there is no high road into the stomach for diphtheria, tubercle, and typhoid bacilli; that, on the contrary, they are destroyed by the normal secretion of the stomach.

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The several diseases of the mouth and throat have their own indications. They should not concern us here.

The hydrochloric acid of the stomach has a germicidal effect. Strauss and Wurtz observed it to kill anthrax in half an hour, typhoid and cholera bacilli in from two to three hours. But they also found that the same amount of hydrochloric acid would act better in a test-tube than in the stomach in which it is mixed with chyme or combined with albumin. Thus it happens that bacilli of typhoid *may* pass the stomach uninjured. That occurs mainly when the stomach secretes but little hydrochloric acid—for instance, in hydræmia, in catarrh, or in other cases of achylia gastrica. Such conditions furnish at once the indication of administering hydrochloric acid, both for its digestive and its germicidal action.

Fermentations occurring in the milk on which infants and children are fed have been studied very extensively. They occur so frequently as to explain the multiple infections of the infant intestine. Lactic fermentation exhibits Pasteur's *bacillus lactis*, also staphylo- and pneumococcus; the fermentation of casein, Duclaux's *tyrotrix*, *leptothrix buccalis*, *bacillus subtilis* and *mesentericus*, and others. Butyric fermentation is secondary to lactic fermentation, and is due to the presence of *bacillus butyricus*, which is found in milk contemporaneously with *bacillus lactis*, but remains latent until lactic fermentation is completed. It lives on the *bacillus lactis*, and at the expense of the lactic acid when in excess. In connection with this fact the excess of milk-sugar in infants' food becomes a very doubtful blessing. It may be known to some that these forty years I have constantly taught the advisability of avoiding that excess. Led by observations in the nursery and at the sick-bed, I have always taught that cane sugar (and not milk sugar) should be added to the food of infants, the milk-sugar of the cow's milk being sufficient to supply the required amount of lactic acid.

Chronic gastritis, besides the best known symptoms, causes mental and emotional disturbances amounting to

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hypochondria. Gastric fermentation produces hydrogen and carbonic acid which dilate the stomach and cause a diffused (not localized) pain. The irritated gastric nerves cause a disturbance of the nerve centres, with vertigo, severe headache and agoraphobia, and of the heart, with cardiac asthma, palpitation, and an arrhythmic pulse.

The stomach is very apt to be overloaded. As long as the small intestine is crowded the stomach is, through reflex action, prevented from discharging its contents. Before the Moscow Congress Dr. Von Mehring detailed the following experiment: The duodenum of a dog was cut and both ends fastened in the abdominal wall. When the lower end was completely filled with milk or other absorbable material, water introduced into the stomach would not leave it through the fistula. Two important clinical observations become thereby amenable to an explanation: The first is this: that babies who are crowded with otherwise appropriate and absorbable food may die of marasmus; the second, that persistent constipation keeps the stomach filled with the ingesta, no matter of what nature, to the detriment of nutrition. The latter is, in these cases, impaired because of the nature of the stomach, which absorbs very little besides solutions of salt in water, peptones and solutions of dextrine or of grape sugar, and alcoholic beverages. Water, for instance, is not absorbed in the stomach. When it is introduced into the normal stomach, it is expelled through a duodenal fistula established for the purpose of observation.

Pepsin and rennet are secreted by the glandular cells of the pylorus and of the fundus; hydrochloric acid from the chlorides in the circulation of the surface epithelia; lactic acid is produced by the bacteric fermentation of the carbohydrates contained in the stomach. When no milk-sugar or no other carbohydrates are introduced there is no lactic acid. After a meal consisting of hydrocarbons there is lactic acid, however, only for some time, say half an hour; after this period there is hydrochloric acid. At first it combines with the salts it meets, at the same time it interferes to a certain extent with the transformation of starch and stops its complete saccharification. Its

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principal effect, when in sufficient quantities, is the prevention of abnormal fermentation and putrefaction. These become prevalent when a gastric disease diminishes the secretion of hydrochloric acid.

In dilatation of the stomach, no matter whether the secretion of hydrochloric acid is wanting, diminished, normal, or excessive, mostly, however, when it is defective, the motory incompetence of the organ which results in undue retention of the contents, causes fermentation. It produces lactic, butyric and acetic acids, and gases. Carbonic acid and hydrogen originate in the putrefaction of hydrocarbons, hydrogen and sulphide of hydrogen in that of albuminoids. The accumulation of ingesta may cause endosmosis of water into the stomach. That process may lead to constipation, scanty urine, dry skin, and desiccation of the muscles and the nervous system. Tetany has been observed under such circumstances, partly from the changes in the physical structure of the nerve tissue, and partly from auto-infection.

Tuberculosis, typhoid, or other infectious ulcerations are rarely found in the stomach, because their bacilli meet hydrochloric acid during the few hours while chyme is forming. But a certain quantity of the acid in, and good motory power of, the stomach, besides a mere normal, not excessive, peristalsis are required to prevent putrefaction in the intestine. In the colon this putrefaction is quite common, and proves the introduction of microbes with the albuminoids. All sorts of infectious deposits, besides putrefaction, are noticeable when the microbes are introduced in great numbers; when the secretion of hydrochloric acid is insufficient; when the motory power of the stomach is impaired, and when the resistance on the part of the pylorus is incompetent. It is evident that these wants should be corrected. Abnormal acids in the stomach should be neutralized by alkalies; the motory power of the stomach increased by strychnine, electricity, massage, and hydrotherapeutic applications (mostly cold); gastric catarrh relieved by occasional or regular irrigations; the insufficiency of pepsin by the administration of pepsin; the absence or lack of hydrochloric acid by its introduction

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in proper amounts of water, in a proportion of from 2 to 5 in 1000; and by a fair amount of sodium chloride to all kinds of food, mainly to cow's milk and to farinacea.

This demand is more than merely theoretical. In thousands of cases observed by me, of indigestion caused by the presence of fat acid (while hydrochloric acid was absent, or scanty, or retarded), I have seen immediate improvement by giving both, alkalies from five to ten minutes before meals for the purpose of neutralization, and hydrochloric acid (correctly diluted) during and immediately after meals. From 8 to 15 drops of the diluted acid in a glass of water, mostly hot, will usually suffice. When hydrochloric acid is secreted or introduced in sufficient or excessive quantity, pepsin may be absent. In those cases the latter should be given in addition.

To give pepsin alone, however, as a routine treatment, is rarely correct. For when it is absent, the epithelia are no better developed than the peptic glands. Thus, while pepsin is given it should be considered inert unless it meets hydrochloric acid in the stomach, or be combined with it.

Putrefaction which takes place in a stomach which is weakened by muscular incompetency during anæmia, convalescence, dilatation, or by congenital muscular insufficiency, should be treated locally; there is no reason why the slow process of improving secretion and motory power should be relied on solely. It is in these cases that resorcin is obviously a reliable remedy. An adult may take from one to one and a half grammes a day, a baby from four to ten centigrammes a day. If after a long search, as I have instituted it, you find a few reported instances of large doses which did not kill, there should be no temptation to give more than the small doses which I advise and which prove successful. The effect of resorcin is the more speedy and local the greater its solubility and the facility with which it may be combined with other drugs.

The choice of alkalies depends in part on indications other than that of mere neutralization. Bicarbonate of sodium will momentarily neutralize acids encountered in the stomach, but it incites the secretion of hydrochloric

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acid, an excess of which may prove uncomfortable. It often causes a burning sensation. One of the principal objections to the bicarbonate may also lie in the evolution of carbonic acid. In the individual case it may be questioned whether its stimulating effect on peristalsis is preferable or objectionable when compared with the inflation of the stomach engendered by it. All carbonates have this disagreeable feature. That is why I prefer calcined magnesia, the "magnesia" of the *Pharmacopœia*. It has the additional advantage of relieving the constipation which is a frequent complication, and not infrequently a direct cause of a putrefying process in the stomach. An adult will take from two to four grammes a day, in from three or four to eight or ten refracted doses.

The irrigation of the stomach meets with difficulties in few instances only, with almost none in infants and children, in whom a catheter, No. 25 or 30 French, is sufficient. In the adult the post-laryngeal region may offer an occasional obstacle, which, however, is overcome by patience. When the pharynx is too irritable, or the patient refractory, the tube may be introduced through the larger, mostly the right, nostril. When it does not readily pass into the œsophagus the patient should be made to swallow, when it will glide down. Salt water solution of 7:1000 may be run through it from a funnel or a fountain syringe which is slightly raised above the level of the pharynx, and lowered when the fluid and stomach contents are to flow out. This salt water may be mixed with a disinfectant, say thymol, 1:3000 or 4000, or in cases of hyperacidity with bicarbonate of sodium 1:200 or 500. The temperature should be that of the body when this is normal, somewhat or considerably cooler when there is a high elevation, or warmer when there is a reduction of the body temperature. Alcohol should not be added to the injection, because its dilution is partly absorbed by the stomach. On the other hand, when water is injected without salt, it causes osmosis of the body fluids into the stomach, sometimes to such an extent as to visibly increase the amount returning from the stomach.

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The irrigations should amount to 100 and more cubic centimetres in the nursling, 200 or 300 in the child, 500 or 700 in the adult. They should be repeated until they return clear. The tube should always be withdrawn quickly so as to avoid irritation of the fauces.

Bile is credited with antiputrid properties, which, however, are not possessed by it in its alkaline or neutral condition, but are connected with the free, mainly the taurocholic, acid. As bile (mainly, however, when exposed to air) undergoes putrefaction very readily, the main object during life is to keep the function of the liver normal. Unfortunately, whatever influence we may have over it can be attained only in the course of time. Neither salicylic acid, nor sulphate of sodium, nor calomel can be relied on in acute cases which require immediate correction or disinfection, except through their purgative effects.

When the acid contents of the stomach meet bile a deposit is formed which is dissolved in an excess of bile and in the sodium chloride which is formed during the neutralization of the hydrochloric acid. These changes are, however, not uniform, inasmuch as the acid gastric contents, the alkali and acid of the bile, and the alkali of the pancreatic juice, mix in different proportions.

In all probability the part taken by the pancreas in digestion and nutrition, when fully appreciated, will certainly be recognized more than formerly in our therapeutics. As a preventive the use of fats—cream, ice-cream, fried foods, and excessive albuminoids—should be avoided. Mercurials appear to stimulate the action of the pancreas. Such stimulation, however, is apt to become excessive, and the omission of mercurial over-medication (so common in former times) cannot but act favorably in the preservation of that organ. Still moderate mercurialization will always play an important rôle in its chronic inflammations of a sclerotic or of a syphilitic nature. So will the iodides. Carcinoma of the pancreas, either isolated or complicated, is in our times, unless it can be relieved by an operation, best treated by methylene-blue, the effects of which in retarding or even diminishing carcinomatous growths in all

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the viscera, I have too often noticed in these ten years to doubt their reality. Pilocarpine, whose action on the salivary glands appears established, may be tried in small doses. The stimulation of the duodenal glands by alkalies and bismuth may do good by exciting their vicarious action. The physiological incompetence of the pancreas may be rendered partly innocuous by the administration of animal pancreas or pancreatin. The former appears more physiological, for pancreatin is liable to be destroyed by the action of gastric acid.

In this way the absence of the function of this viscus, which certainly is a factor in causing intestinal toxicity, may be shorn of part of its deleterious effect. If not much of a curative agent in infection of the bowels, this method may become a preventive.

There are, however, cases of pancreatic disease which show to a marvellous extent the self-help of nature. There are those in which indican is diminished for the following reason: One of the functions of the pancreas is the transformation of albuminoids into peptones, and of this into leucin and tyrosin. When fermenting they form skatol, phenol, and indol. The latter is developed in larger quantities out of pancreatin peptone than out of the albuminoids of meat; thus it appears that the peptic effect of the pancreatic juice (mostly trypsin) favors the production of indol. That is why *diseases* of the pancreas may diminish the amount of indol and its product, indican, to such an extent that even in obstruction of the small intestine, where an increase of indicanuria should be expected, the latter may be absent. (Leube.)

Another way in which nature appears to neutralize its own injuries is suggested in the fact that the result of peptones and their putrefaction, the formation of leucin and tyrosin, works its own destruction. Amongst their final productions is phenol, a disinfectant. That is not only so in the normal, but surely also in the diseased intestinal tract. It struck me decades ago, and I suggested the notion in a footnote in my *Treatise on Diphtheria* (page 93) nearly twenty years ago, that the rapid recovery and improvement of the general condition, for instance,

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after typhoid fever, might be due to the large amount of disinfecting phenol and other substances evolved out of the toxic material of intestinal secretions and excretions.

The processes of fermentation and putrefaction which take place in the intestine are least intense in the upper part of the gut, become more marked in the lower portion of the small intestine, and less so again in the lower colon after desiccation by fever has become more effective. In the duodenum and jejunum there is, under normal circumstances, no putrefaction, but fermentation only; albumin is not here decomposed by microbes; it is not, however, protected any longer by hydrochloric (which is no longer met with), but by organic acids. Whatever microbes are found in the normal small intestines decompose hydrocarbons through the formation of ethyl alcohol and organic acids.

The putrefaction of albuminoids which takes place in the colon differs from pancreatic digestion. The latter furnishes albumoses and peptones, lysin, lysatenin, proteinochrome, amido acids, and ammonium. The putrefaction of albumin furnishes the same products, and proceeds further to the formation of indol, skatol, parakresol, phenol, phenyl-propionic acid, fat acids, carbonic acids, hydrogen carbonoid, hydrogen sulphide, and some others, all of which have been studied by Nencki, Baumann, Brieger and Salkofski. Many of these products are of intense interest, because of their elimination through the kidneys; some, like the oxy-acids, are not changed at all; phenol is absorbed directly, indol and skatol have to be oxidized and are passed as indican and ether sulphuric acids. Their quantity, which depends upon the amount of intestinal putrefaction, determines the greater or smaller injuries suffered by the formerly healthy kidneys during the varied putrid and infectious processes or diseases. Indeed, the number of renal affections, from a slight and temporary irritation (with renal epithelium and hyaline casts and a few blood-cells) to a serious and incurable disease brought on by the absorption and forced elimination of toxins are very numerous. On the other hand, it requires no theoretical demonstration that kidneys previously diseased are not

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fit eliminators and add to the original dangers, and, finally, that in every case of intestinal intoxication, excessive putrefaction, or infection, the condition of the kidneys should be studied at once, and preserved in its form, or if possible, improved. Diuretics may often prove life-saving.

Not only food, but also the albuminous secretions of the intestines, and bile, undergo putrefaction by themselves; that is proved by the fact that putrefaction takes place during starvation, no food being present. It is only in the fœtus with its entire absence of intestinal putrefaction that biliary acids and coloring matter are met with undecomposed.

There are other facts which prove the occurrence of putrefaction in the intestine, even in the absence of food or food remnants.

The gut is capable of forming excrements without the presence of food or food remnants. When Hermann separated a circular piece of intestine from its contiguity it still became filled with a feculent mass. A thick conglomerate of epithelium is formed below a preter-natural anus. The colon of a newborn contains frequently large masses of dry epithelia. Heidenhain found fecal masses consisting of epithelia and numerous nuclei originating in Lieberkühn's glands in experimental inanition and during the absence of bile. A frequent instance of this are the masses of epithelia narrowing the lumen of the colon which may be found in the intestines of many newly born.

Putrefaction inside of the gut does not reach the degree of that outside the body for obvious reasons, which are mainly the presence of organic acids and the relative exclusion of atmospheric air. In the intestine the absence or diminution of absorption is also a powerful factor. That is, the more putrefaction the more fluid there is in the interior. Besides, the quantity of food is also of much importance. Carbon hydrates interfere with putrefaction; so does, but only to a certain extent, milk; more so, however, its fermented products—kefir, kumyss, and matzoon. Thus both theory and clinical experience favor

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the exclusion of meats and the selection of farinacea and milk preparations as the nutriment of patients suffering from intestinal putrefaction.

But Schmitz excludes casein from the praise due to milk; that is another proof of the correctness of many previous observations of the necessity of diminishing or suspending it in the food of sick infants or invalid adults.

Free acids interfere with putrefaction; therein lies part of the advantage of hydrocarbons which furnish acids through fermentation; thus these co-operate with the acids of the bile. It appears a pretty well established fact that putrefaction may be corrected by the presence of acids in the upper and the absence of water from the lower part of the tract. To the observation that absence of gastric hydrochloric acid led to increased putrefaction has been added the knowledge, both experimental and clinical, of its correction by the administration of hydrochloric acid. Another indication for the correctness of improper putrefaction and absorption of putrid material may also be found, perhaps, in diaphoresis, and in astringents, such as gallic acid and those vegetables which contain it. Many observations point to the adjuvant effect of opiates, because of their action in limiting secretion; still I hesitate to recommend them as a routine treatment. Indeed, no treatment should be routine.

In many a case it may be doubtful whether a microbic or toxic disease in a distant organ may be the result of intestinal putrefaction or not. Bacteria are but rarely found in the circulating blood or lymph; thus embolic deposits can but seldom take place in this way. In the moribund exceptions to this rule are met with, but in them the tissues and membranes resemble more or less those of the dead in regard to mechanical and chemical alterations. Fischl even claims that in the living the infiltration with leucocytes of the submucous tissue, and a secondary inflammatory process caused by the presence in the intestines of microbes, is rather a protection to the organism against the migration of microbes from the alimentary tract. Still pneumomia, for instance, has often been claimed as the result of such emigration of streptococcus, staphylococcus,

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bacillus pyocyaneus, or bacterium coli; so have cystitis and pyelitis. But the methods of research have been charged in many cases as having been incorrect and unsatisfactory. It is mainly the examinations of blood that, in the opinion of critics, left much to be desired. It is particularly the method of examining the blood taken from a finger which is considered inaccurate, because it is thought to be impossible to sterilize the surface and the ducts of the cutis with any amount of alcohol and ether, and it is claimed that the blood to be employed for a conclusive examination should be taken from a vein. Fischl claims that of many such cases of general sepsis induced by enteritis only those described by Escherich, by Hirsch, and by Libman are worthy of confidence. Thus, after all, there are certainly some instances of a general microbic infection originating in the alimentary canal that are not doubted at all. On the other hand, it is possible, as it was suggested forty years ago by Ritter von Rittershayn, that when a septic enteritis and a pneumonia or another infectious disease are found side by side, all of them may result from a common septic or septicopyæmic source.

On the foundation of 194 papers and essays which he quotes and of his own research E. Opitz (*Zeitsch. f. Hyg. u. Infect.*, xxix. 1898) arrived at the following conclusions: That the intestinal wall when normal is not pervious for bacteria, and that no bacteria are absorbed into chyle during digestion, though there be slight lesions of the internal surface. Even serious chemical or mechanical lesions permit the admission of bacteria into the circulation in exceptional cases only. Nor is there a proof of the entrance into the circulation of bacteria from the intestine. As far as the kidneys are concerned, he came to the conclusion that they caused no physiological elimination of bacteria floating in the circulation. The presence in the urine of bacteria, previously injected into the circulation, is explained, according to him, only by mechanical and chemical lesions of the bloodvessel walls and of renal epithelia.

I have presented all these facts or suggestions which are taken to be the proofs against the alleged dangerousness

of enteric putrefaction or infection in order not to be reproached with claiming too much myself. But after all, what does it all mean? Of the clinical facts proving the existence of auto-infection there can be no doubt in the minds of practitioners and clinicians. If the microbes of these infections are not found in the circulation and in the distant organs, the cause must be something else. This something else is the toxin formed by the very bacilli.

Nor is this all. No amount of laboratory research of a negative character can nullify the merest clinical observation. In my own laboratory I examine the urines of 100 patients a week; no two weeks pass, I am certain, sometimes no week, in which an otherwise normal specimen of urine, perhaps in some cases discolored by a trace of albumin, does not contain bacteria, mostly of the coli order, enough to cause turbidity. This condition is not always complicated with serious septic troubles, sometimes with none at all. But still, there they are, and must come from somewhere. Spontaneous generation does not exist, and immigration is the only explanation. These are facts, and as it has often happened previously, when they were proclaimed to be impossible, the theory will be found to require modification, not the facts. Those bacteria come mostly from the intestines, rarely from outside through the urethra. Let me show you how that may, and probably does, occur.

Living tissues do not act like test-tubes or like dead membranes. The latter are pervious according to the simple laws of diffusion and osmosis; not so the former. Even the epithelial cell is an independent organism with an active contraction like an amœba, and with independence in regard to absorption. Fat molecules, for instance, enter the lymph ducts, but molecular pigment is rigorously excluded. In the intestinal epithelia of cold-blooded animals movements and changeable processes, like feelers, in and out, backward and forward, have been observed equal to those in amœbæ. Indeed, all differentiated cells choose what they mean to absorb; for instance, the epithelia of the mammary or other glands which select their proper food or constituent.

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The practical conclusions are obvious. Disinfection must be resorted to. Disinfectants have sometimes been considered inopportune or contraindicated, because they cannot be given in sufficient doses to destroy bacteria or toxins. It is true that it is easier to destroy the living cells of the organism than bacteria. Not many years ago, however, Prudden could prove that a one-twentieth of a one per cent. solution of carbonic acid would annihilate the action of bacteria, not indeed, by killing, but by paralyzing them. Charrin followed him lately. To prevent them from evolving toxins is as beneficial as to destroy them. This is true of such internal remedies as clinical experience found to be indicated in those cases which are evolved out of, or are complicated with, the different forms of enteritis or entero-colitis. Vaughan believes that much harm and no good can be obtained from them—perhaps he speaks of injurious solutions only—but every clinician knows that the eminent bacteriologist is mistaken. It is true that calomel, naphthol, naphthalin, salol, and camphor in medicinal doses do not diminish the number of bacteria, nor even of saprophytes, but the microbes become less virulent. “By their fruits ye shall know them.”

I advise practitioners not to be exclusively guided by statements coming from those who, while being expert and recognized bacteriologists, have less clinical experience. In the test-tube they obtain results which do not agree with other positive observations. They cannot, and sometimes do not, weigh the difference between a dead test-tube and the action of the living cell. I cannot but ever insist upon the fact that a number of well-observed and regulated clinical facts have the same dignity that is attributed to the results of microscopical and bacteriological exhibits. Both may be delusive or conclusive. When it is stated that disinfectants have not even an effect on putrefaction which is going on in the dilated stomach, though it be within reach and accessible, we know that this plea is erroneous. In the same way it has been claimed that intestinal putrefaction cannot be influenced. That is also a mistake. A number of years I have treated typhoid ulcerations and their offensive discharge with

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naphthalin. They were so readily disinfected, their fetor annihilated, and the character and number of the stools improved, that many seasons I made its administration a routine treatment. The same favorable result I often attained in the discharge of the tubercular intestine. In all such cases it is true, however, that the effect is modified by the quantity and quality of the contents, by the rapidity of expulsion, by the resisting power of the intestinal bacteria, and by the slowness or rapidity of absorption. It has been claimed that bacteria and their toxins are liable to be beyond reach because of the facility with which they enter the tissues of the intestinal mucous membranes. Now we are aware that we cannot reach, improve, or cure every case, but also that remedies may follow in the same tracks opened by the enemy. The result will depend on the quantity of bacteric or toxic material which can still be reached.

Remedies which are to act as disinfectants of the intestines must be able to reach them. There are some that are known to pass the stomach undissolved, for instance, salol, salicin, naphthalin, and others. Many writers who are very doubtful in regard to other drugs admit that those mentioned may be of service. To permit soluble preparations to pass the stomach and to exhibit their effect in the bowels, they have been covered with keratin, which is not dissolved in the gastric acid or by other material of equal repute. I advise to try every such preparation for its merits, at least for its solubility. Many of them I have experimented with by exposing them to water, salt water, or acidulated water, and found them insoluble; before I did so I picked many of them out of the discharge of my patients. They withstood both stomach and bowels as if they had been so-called sugar-coated pills. And many will be the disappointments of practitioners who are so good-natured or confiding as to rely on claims not substantiated.

The soluble disinfectants whose action is said to be limited, or nearly so, to the stomach only, are more serviceable than they appear to be. Their solubility does not prove that they do not reach the intestine. This latter

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assertion was based on the belief in their absorbability while in the stomach. This organ, according to Meltzer and other physiologists, absorbs but little; the soluble disinfectant is carried down into the intestine with the rest of the gastric contents; moreover, the effect of tincture of iodine or the iodide in its combination with iron or of resorcin is well established. It is mainly the latter which is very reliable, though in the test-tube its anti-fermentative action is no greater than that of chloral hydrate or nitrate of silver, and certainly inferior to menthol, thyme, betanaphtol, or salicylic acid.

Next to a thorough expulsion by purgatives of the infected contents in its efficacy in intestinal putrefaction and in secondary infection of the organism (partly through the general blood and lymph circulation and partly through the kidneys), stands the improvement of the surface of the mucous membrane. Like chlorate of potassium, which by healing stomatitis prevents cocci or bacilli from entering the circulation in the mouth, so tannin, or better, gallic acid, which is tolerated in large doses—from three to six or eight grammes a day by adults—bismuth subnitrate or subgallate, tannigen, tannalbin, or nitrate of silver improve the condition of the mucous membrane and its epithelial cover so as to limit absorption.

During gastro-intestinal infection or intoxication the first indication is prevention by withholding or changing the food. Being taught by example and experience, I have not feared to deprive patients suffering from the vomiting and diarrhoea of gastro-intestinal infection of food for many hours or a day. Food introduced and brought up again and causing hyperistalsis and new infection is worse than food withheld. Of equal importance is a change in the selection of food. Acid (lactic acid) dyspepsia requires (egg) albumin-water, albuminoid putrefaction in the colon demands farinaceous food. Milk must be withheld in these acute cases. Give no sterilized or Pasteurized milk, no breast-milk. As I but lately said in an article on cholera infantum, in the *Twentieth Century Cyclopædia*, under ordinary circumstances milk feeds babies, under extraordinary circumstances bacteria. None

should be given until the discharges are no longer offensive. Small babies or adults may take a mild tea in drachm doses, or a few drops of whiskey in barley-water may be given in short or longer intervals. A mixture which I used and recommended these thirty or forty years in the infectious diseases of the infant, when the period of vomiting and diarrhœa and starvation had passed by, consists of 150 c.cm. of barley-water, the white of one egg, one or two teaspoonfuls of whiskey, and some salt and cane-sugar. Milk-sugar should be carefully avoided in this condition. Of this mixture a teaspoonful is given every five or ten minutes.

Dyspeptic children are very apt to suffer from erythema as the result of intestinal infection or auto-infection, sometimes to such an extent that the diagnosis between it and scarlatina may become doubtful. The difficulty grows in those cases in which the intestinal erythema is attended by a corresponding intestinal fever, which is not at all an uncommon occurrence, and is frequently mistaken for malaria. Constipation, which does or does not accompany dyspepsia, may in rare cases lead to the same result. The diagnosis of the condition is not always easy, for such reasons as the apparently normal condition of the stomach, the absence of diarrhœa, and the actual or alleged absence of flatulency. This erythema is frequent; it may last hours or days, or alternate with acute attacks of urticaria. The latter is, therefore, not always gastric or neurotic, but may be toxic, and thus share the etiology of many cases of acne and senile pruritus. When in the face it may be mistaken for erysipelas.

This variety of erythema is sometimes seen on hands and feet, is symmetrical, and now and then, like urticaria, has vesicles of bullæ, sometimes in the shape of herpes iris. When it accompanies intestinal infection, either imported or indigenous, it is usually accompanied by indican and the ether sulphuric acids in the urine, which is liable to be very scanty and of high specific gravity. Skatol and indol are found in the feces. In most cases a purgative will bring instant relief—calomel is the best; but a lasting

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improvement will only come from protracted disinfection of the intestinal tract by naphthalin, salol, resorcin, oil of peppermint, small doses of calomel or bichloride of mercury, from large enemata containing one-twentieth per cent. of thymol, one-fortieth per cent. of permanganate of potassium, or from such as consist of aromatic infusions (catnip, mint, chamomile); from occasional purgatives, and from the regulation of the diet which should be so arranged as not to cause fermentation and putrefaction. The sulphites of sodium and magnesium have disappointed me. Menthol should not be advised; it can be taken, however, by older children or adults, but in capsules only. It has a local irritant effect and has no properties not possessed by other drugs.

The practice of giving antifermentatives has preceded its theory for centuries. Still the theory is not quite so recent as some believe. In a paper on the "Treatment of Infant Diarrhœa and Dysentery," published in the *American Journal of Obstetrics, etc.*, 1876, I made the following remarks: "One indication is to destroy ferments. For that purpose most metallic preparations will do fair service. One of them is calomel; as to its effect as an antifermentative there can be no doubt. Possibly it acts by a portion of the drug being slowly changed into bichloride of mercury."

"Alcohol certainly arrests fermentation." "Sometimes, particularly when the stomach can be relied on, the salicylate of sodium may be added to the internal treatment. . . . The salicylate acid may prove beneficial, both by its antifebrile and disinfectant action." In my *Intestinal Diseases of Infancy and Childhood*, Detroit, 1887, I recommended calomel, bismuth, alcohol, creosote, salicylate of sodium, and resorcin.

Irrigation of the intestinal tract is performed while the patient is on his side, with raised hips. The nozzle of the irrigator (fountain syringe) or of the tube connected with a funnel is introduced a few centimetres beyond the internal sphincter, or much more. In the adult with a normal sigmoid flexure a tube may be introduced from 20

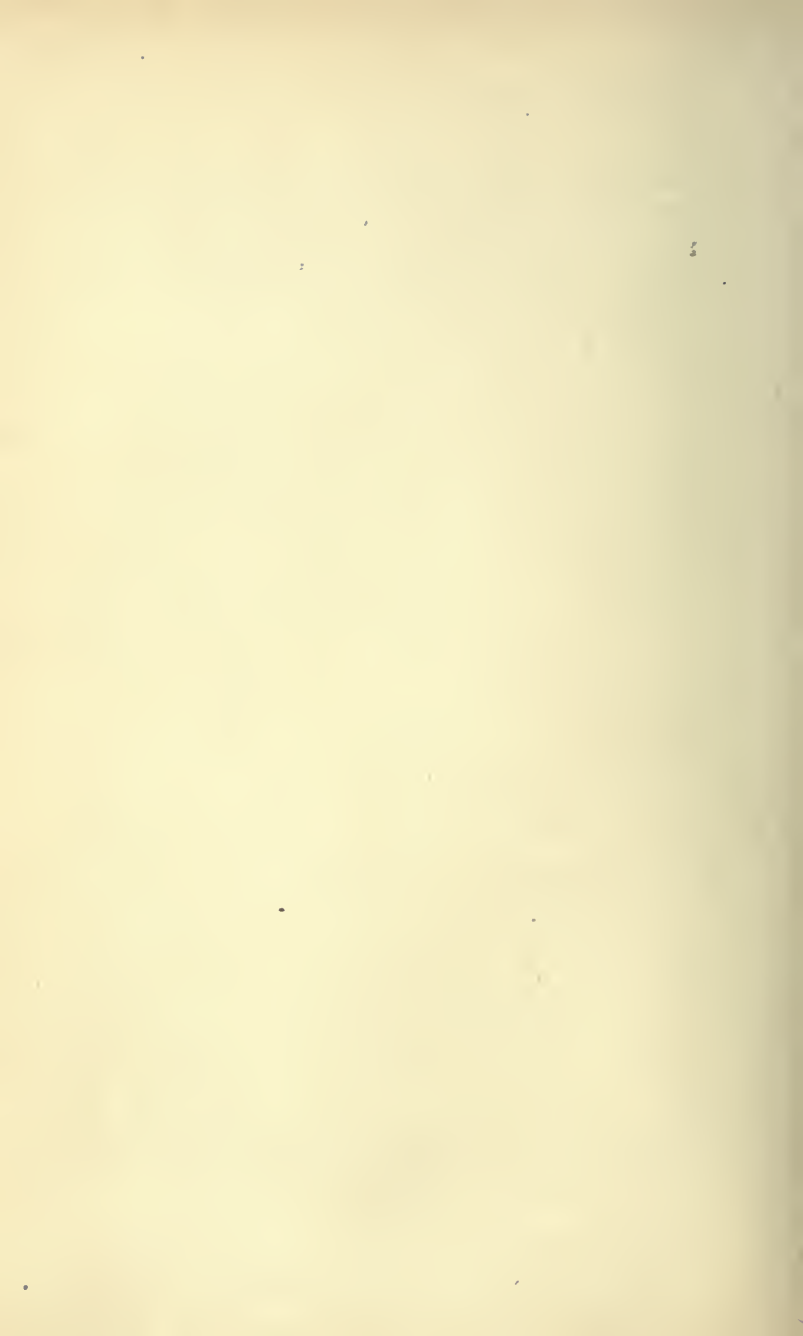
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to 40 centimetres; but many reports of long distance introduction are to be accepted with caution, for a stiff tube is able to raise the intestine and may be felt in the hepatic region, while a flexible one is liable to turn upon itself. That is particularly so in infants and small children in whom the sigmoid flexure is multiple and can rarely be passed by an instrument. In them, as in most adults, the raising of the hip may be successful. In some cases it is advisable to raise the lower half of the body according to the method I have followed these thirty years to reduce intussusception; in these cases I raise the body considerably and support the abdomen by a soft pillow while the face is turned to one side to facilitate respiration. While the anus is firmly closed the liquid is allowed to flow in from a slight elevation, from 10 to 50 centimetres. A greater elevation raises the pressure to an unbearable point. A slight elevation will improve the tolerance of the intestinal tract, which may thus be filled to the ileo-cæcal valve, and beyond. In rare cases the very stomach was reached. It is only an abnormal intestine, dilated in places, or bound down by previous adhesions, or normally sensitive, that resents the flow of the liquid by spastic contractions or pain or vomiting. The indication of a greater or smaller elevation is guided, in special cases, by the object or objects to be attained. Part of the liquid is absorbed, and quickly, too, sometimes. That is why, when that is not desirable, the irrigator should be raised. Then the intestine fills up more rapidly, and the return of the fluid, with the contents of the bowels, is more readily secured. From 1000 to 2000 or more cubic centimetres may thus be introduced into the bowels of an adult with the result of a thorough cleansing. Tepid or cool water should be chosen in those cases in which there is hyperthermy, water of the body temperature when the temperature is normal, hot water when there is hypothermy with or without actual collapse.

Medicinal agents may be added to the water. Besides salt to form a physiological solution, I recommended subnitrate of bismuth in dysentery. In typhoid fever and

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tuberculous and other ulcerations, thymol 1:3000 to 5000, permanganate of potassium in the same dilution; or bicarbonate of sodium, 1:100 to 500, have served a good purpose when the secretion of mucus was excessive; less, however, in membranous enteritis than in the usual form of catarrh. Such irrigations may be repeated a number of times daily, according to necessity.



INOCULATIONS WITH PROFESSOR KOCH'S "TUBERCULIN"

INOCULATIONS were commenced by me December 10th in the Mount Sinai Hospital, on the very day when Dr. Kinnicutt made his first injections in St. Luke's. On the following day I began in the German, two days after, at the suggestion of Dr. Reid, attending physician, in the Foundling Hospital. At a later period a case of epithelioma was observed, and inoculated for a while in the Skin and Cancer Hospital. The majority of the cases in the Mount Sinai Hospital belonged to the service of Dr. I. N. Heinemann, attending physician, a number were also furnished by the other physicians and surgeons of the institution, and some of the most interesting material by Dr. Goldenberg. To Dr. Heinemann belongs the credit of having spent a great deal of time and labor on the numerous cases gathered in that institution, while I attended the other places. He will appear before you with the reports of what he has observed and accomplished. The cases which form the basis of my report number about sixty, fifty of which were observed in the German Hospital and are carefully tabulated. They comprise nearly all the varieties of tuberculosis, that of meninges, lungs, glands, bones, peritoneum, joints, every one of which was carefully watched by a most competent house-staff and painstaking nurses both day and night and temperatures taken, with rare exceptions in rectum or vagina, almost in every case every two or three hours for weeks in succession. I may be permitted to add a single remark, viz., that from the beginning I have tried to be as unbiased in my observations and experiments as would be permitted by the overpowering sense of the influence of a scientific discovery of extraordinary weight and importance.

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The effects claimed by Robert Koch for his "Tuberculin" are as follows:

Its action on tubercular processes of whatever nature, is specific. It is either general or local. Reaction in internal organs cannot always be proven, because it is not amenable to direct observation, with the exception of increased cough and expectoration; here the general reaction predominates. There are local changes in the visible tubercular processes. An injection of 1 ctgr. always has that effect. Therefore, the lymph is an indispensable means of diagnosis. When the diagnosis of tuberculosis cannot be obtained by the finding of bacilli or elastic fibres in the sputa, tuberculosis can with safety still be diagnosticated by the presence of the reaction. In the same way doubtful cases of glandular, osseous, and cutaneous disease can be recognized.

The action of the lymph on the tissue surrounding the bacillus is marked. It produces changes resulting in necrosis of that tissue without destroying the bacilli. In the beginning small doses are sufficient, afterward larger ones are required. When a tuberculous patient requires as large doses as a healthy person, at the same time exhibiting as little reaction as the latter, it is to be presumed that all the tuberculous tissue amenable to reaction has been destroyed.

Phthisical patients in the first—incipient—stage were relieved of all morbid symptoms in from four to six weeks, so that they could be considered as cured.

Patients with cavities of moderate size were much improved and almost cured. Thus it is to be presumed that incipient phthisis can certainly be cured through this remedy. Relapses are possible, for the time of observation has been too short. Still it is fair to presume that relapses will be removed as quickly as the first attack.

The general reaction means increase in temperature. It seldom appeared after an hour or two, generally after from four to nine hours, reached its maximum mostly about the ninth or twelfth hour, and diminished gradually. Sometimes after it had commenced to sink it had another rise,

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as you will remember to have seen in many of your cases of typhoid fever, where a double curve is not unusual. In a number of my children the temperature rise was not marked. Proportionately large doses were required. There is a parallel, perhaps, with what we notice in other circumstances. For instance, cardiac stimulants require larger doses, comparatively, in children, and in them also the effect of the typhoid infection is less marked. Both the typhoid virus and the Koch virus are ptomaines. Still this is but a suggestion.

The general reaction was noticed in many cases after doses of 1 or 2 milligr. That effect was not obtained when, after a brief time, ten or twenty times as much was injected.

The increase of temperature would often correspond with pulse and respiration; sometimes these two would not, or not much, be affected. The general condition of the patient would mostly be altered with the change of temperature, but not always in the same proportion. Sometimes there was comfort with high temperature, sometimes great discomfort, languor, muscular pain; once a localized pain in a distant organ (the left arm) when the right elbow was affected, rigor, perspiration, with a moderate temperature; in one case (with no rise of temperature) there ensued very great dyspnœa, angina pectoris, fear of annihilation, which required active medicinal interference.

Instead of rising after the inoculations, the temperature may fall, but the patient's comfort may increase. At the same time, with a low temperature, and feeling comfortable, he may improve, or not improve, or get worse. The temperature may rise, or not. In those of tubercular lungs worse, may also feel worse.

In cases of non-tubercular lungs (suspicious or not) the temperature may rise, or not. In those of tubercular lungs I have seen inoculation raise the temperature, not influence the temperature, and reduce the temperature. The changes in the lungs were not uniform. The usual results of an inoculation were diffuse rhonchi, sometimes dyspnœa, and increased expectoration, which became more mucous, and was a few times tinged with blood. Thus it happened

that in one case the number of râles and of indurated areas increased in number and extent; sometimes with dangerous, either temporary or persistent results. Sometimes this effect remained more or less stationary, sometimes it wore off in a day or two. In other cases there were no direct local changes, and still there was an improvement of both subjective and objective symptoms. The absence of bacilli in the sputum does not speak against the tubercular nature of the case as long as the time of observation is but a few weeks.

Respiration was often accelerated and superficial, but seldom more than in its due proportion to the increase of temperature, the spleen would swell and sometimes be painful not uncommon. Jaundice I have not seen, with the exception of a very slight touch in a single case; a few times I met with small quantities of albumin in the urine, mainly during high temperatures.

In a small number of cases, mainly such as had a high temperature, the spleen would swell and sometimes be painful, on the second day or later. Another symptom of ptomaine infection was the peculiar appearance of the tongue, accumulations of epithelium in the middle, elevation and redness of papillæ, intense raspberry or scarlet redness of the edges.

Local reaction was sometimes observed round the site of injection; in many cases there was no pain, in others there was. In a minority there was some local redness, in a few some swelling, a day after the inoculation. The eruption was in one case of the size of a hand. A general eruption I have seen but once, when, three days after the first inoculation was made (this time of $1\frac{1}{2}$ milligr.), almost the whole body of the child was covered with a papular rash; afterward 10 milligr. were injected without any such result. Another form of local reaction is that observed near the tubercular locality. It consists in local congestion, redness, swelling, sensibility of the affected parts, be it lupus, gland, sinus, or bone; or such changes in the pulmonary tissue as have been alluded to. It must be said, though, that this may also take place in tissues not affected by tuberculosis.

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For the purpose of diagnosis lymph was injected into Louisa K——, aged twenty. She was admitted November 14th, with the diagnosis of peritonitis, probably carcinomatous. There being a strong doubt expressed because of the youth of the patient and for other reasons, lymph was injected on four successive days—2 milligr., 4 milligr., 5 milligr., 5 milligr. No reaction. The larger number of such administrations in tuberculosis proving successful in producing a reaction, the diagnosis of carcinoma was considered justified.

Maria T——, aged twenty, admitted January 17th. Had a cough since last summer with moderate expectoration, sometimes with a little blood, and some dyspnœa. Ten days ago a chill, pain in her throat; stopped work four days ago; has a "cold," coughs considerably, bled from the nose once. Had no fever when admitted. Over right upper lobe anteriorly, dulness and coarse respiration, some bronchophony. Posteriorly, prolonged respiration. Bacilli not found. On three successive days, 2, 4, and 6 milligr. were injected without any effect. Meanwhile she improved while in bed. The physical lung symptoms are probably due to the results of an interstitial pneumonia in early life.

Lena K——, aged nineteen, admitted December 31st, with symptoms of gastritis, and coarse respiration, with moderate dulness over right upper lobe both anteriorly and posteriorly. No response to 2 milligr. Probably the same conditions as in the previous case.

Kate S——, aged twenty-three, admitted November 22d, with fibrinous pneumonia and pleuritis of the left side. When, about the middle of December, resolution was not complete, dulness and some cough, also rhonchi, persisting, the suspicion of the presence of tuberculosis induced me to use the lymph. Very soon bacilli were found. From December 16th to 23d she received five injections of from 1 to 4 milligr. Reactions were quite marked, and she felt badly. Therefore the treatment was interrupted ten days, and resumed with occasional doses of 5 or 6 milligr. Since January 22d she is on daily doses of 3 milligr., during which she had less fever than before and feels better. Still

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the physical examination of her left lung and pleura is unsatisfactory; particularly as when there was a considerable reaction the whole chest was full of crepitant, subcrepitant, and sibilant râles. Indeed, she is one of the cases which appear to respond so thoroughly, locally, that the fear is justified that the congestion of the pulmonary tissue resulting from the injection may prove dangerous.

Max H——, aged four, admitted January 18, 1891; service of Dr. Kammerer. Scrofulous dermatitis of face. About the ascending ramus of maxilla, left side, the skin is red, indurated, and partly ulcerating and proliferating. Internal organs healthy. For the purpose of diagnosis some inoculations were made, twice of $\frac{1}{2}$ milligr., once of 1, and once of 2 milligr. The latter dose raised the temperature to 102.6° F. within twelve hours, but there was no local reaction, and the inoculations were discontinued.

Conrad S——, aged forty-six, admitted November 11th. Tumor in larynx and ulcerations. Dulness over right lung, rhonchi, no bacilli found in repeated examinations. Deglutition and articulation difficult. Had chancre twenty-eight years ago. Iodide of potassium and inunctions proving rather inefficient, he was given the benefit of the doubt, and three injections were made on January 16th, 17, and 18th, of 2, 5, and 7 milligr. As no reaction became visible, the anti-syphilitic treatment was resumed.

Ernst S——, aged forty-two, admitted January 2, 1891, with temperature 101.1° F., has a small ulceration on the right side of epiglottis, with some surrounding infiltration. One cervical gland. The diagnosis of syphilis very probable, but as there was a dull area over the right apex, he was given the benefit of the doubt. Injections were made.

January 2d. Two milligr. After six hours temperature fell to 99.5° F.

January 4th. Four milligr. No reaction, except perhaps, the temperature of 101° F., which he had before, thus the anti-syphilitic treatment was commenced in earnest.

P——, grocery boy, aged fifteen, admitted January 12th, to Dr. Kremer's service. Dermatitis genu chronica. Scrofula in childhood. Popliteal gland removed six months ago. Since an indurated area in the popliteal region six inches

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in length. Internal organs negative. For the purposes of diagnosis four inoculations were made on January 13th, 16th, 17th, and 18th, of 1, 2, 4 and 6 milligr. without any reaction. The probability was that the dermatitis is not tuberculous, a piece of the skin was then removed for examination and no bacilli found.

Caroline L——, domestic, aged thirty-six. Had the last of several pneumonias in February, 1889, frequent attacks of dyspnœa and catarrh since, and moderate cough. Some phthisis in the family. On December 21st, besides a number of gastric symptoms of which she complained, she had extensive dulness and diminished respiration on the right side, the seat of her last pleuro-pneumonia

One milligramme of lymph was injected at noon, December 20th. Pulse rose from 90 to 100 at 2 P. M.; temperature from 98.6° to 100° F., at 8 P. M. It remained at from 100° to 101.2° F., until next noon, when 2 milligr., were injected. It did not influence the temperature, which remained about the same (100° to 101.2° F.) until noon December 22d. The first two nights, however, she coughed more than usual, had dyspnœa, palpitation, and perspiration, also dizziness and headache. She expressed the same complaints the following days, lymph or no lymph, while her average temperature was less. Only once, on December 23d, it rose to 100.4° F., also on December 24th, at 5 P. M. Then 3 milligr. were injected at 7 P. M. Ten hours afterward, at 5 A. M., December 25th, temperature 98.6° F., at 8 A. M., 101°, the highest temperature of the day except 101.4° F., at 8 P. M. Temperatures up to 101° F. were observed on December 26; 100.8° F., also at 8 A. M., December 27th. After that time until January 5th, when she left the hospital, the temperature was normal, though she complained of alleged chills, headaches, back-aches, stomach-aches. After all we can say that as the lymph had a negative result, both generally and locally, the changes in the lungs were not likely to have assumed a tubercular character—provided that the majority of lymph results are of the diagnostic importance attributed to them by Robert Koch.

A. W——, aged fifty-six, musician, admitted December

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20th. Complained these three months. Has anorexia, ascites, icteric complexion, is feeble. Urine scanty. No history of alcoholism. On examination: Temperature, 99.8° F.; pulse, 120, very feeble. Urine with trace of albumin. Heart negative. Over left lung, superiorly, dulness and coarse breathing. Ascites with but moderate sensitiveness. Iodide of potassium, 2 gm. daily. Paracentesis with permanent drainage; 2,000 gm. in December 25th, 3,000 on the 26th, and 500 in the 29th. On the last two days the fluid was less clear, and contained blood and pus-cells. He was gradually sinking; no good, no harm could be done. One milligr. of Koch's lymph was injected December 31st, at 7.50 P. M., while his rectal temperature was 97.5° F. No reaction of any kind; he continued to sink until January 1st, when he died at noon. No autopsy permitted.

Betty S——, aged thirty, admitted November 22, 1890, six weeks after her sixth confinement, for general debility, dyspnoea, abdominal and dorsal pain, leucorrhœa, pelvic symptoms. Uterus, large and catarrhal. Dulness over right lung, anteriorly, and coarse and prolonged expiration. For the purpose of diagnosis 1 milligr. of lymph was injected December 28th, with no increase of temperature, but marked perspiration. On the evening of January 14th, 2 milligr. were injected, temperature being as always, 98.6° F. Within seven hours, at 2 A. M., it rose to 100.6° F. and had commenced to fall at 5 A. M., when it was 99.6° F. Left the hospital.

Robert N——, aged forty-four, working man, admitted November 29, 1890. Complained of his stomach these fourteen years. For three weeks vomiting, mucous expectoration, and cough. Had chills and pleuritic pain, and lost flesh. Has some dulness over upper lobe, superiorly, and sibilant and mucous râles during inspiration and expiration. No pus, no bacilli. Had temperatures in the first ten days, on December 8th, 103° F., but only once, after that temperature, mostly normal, some few times 101.2° F. On the afternoon of December 16th temperature rose once to 102.8° F., and again on the 17th. For the purpose of diagnosis, 1 milligr. of lymph was injected on the evening of the 17th. For twenty-four hours subse-

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quently the temperature changed between 101.2° and 102.5° F., then it rose to 103.2° and 104.2° F., about twenty-four hours after the inoculation. There were more rhonchi, this time over the whole chest; more dyspnœa. Death occurred on the 19th. No autopsy permitted; perhaps the question might have been settled whether through our congesting and softening the tissue which surrounded the nests of bacilli we hastened the man's death. For though no bacilli were found, I have no doubt it was a case of tuberculosis.

Rosa J——, aged thirteen, had undergone an operation for swollen cervical glands on the right side. Left in September apparently in good health. Admitted December 31st, because of general indisposition and fever. At the upper end of the cicatrix a glandular swelling. Over the right upper lobe diminished respiration behind, and some dulness both anteriorly and posteriorly. A few days in bed restored her temperature almost to the normal. After the evening of January 4th the temperature never rose. For the sake of diagnosis lymph was injected. One milligr. on the morning of the 3d; 2 milligr. on the evening of the 4th; 5 milligr. on the evening of the 6th; 10 milligr. on the evening of the 7th; with not a trace of response. Inoculation was stopped. We also learned from Dr. Kammerer, who performed the operation in July, that the glands he removed were not considered tuberculous. This case would then be conclusive of the motto: "No tuberculosis, no reaction."

A number of cases of external ("surgical") tuberculosis, with two of epithelioma which were introduced as probable cases of lupus, are as follows:

A boy, aged four, with tuberculosis of right knee, tubercular glands of neck, and infiltration of right apex; also an abscess of the right thigh in which bacilli were found. Inoculations were made, twelve in number, ranging from one-half to ten milligrammes. There was some slight response to the first, induced rather more by the first small injections than by the later ones, which were large. No correspondence between such response as was elicited by the lymph in the beginning and the pulse and respiration.

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This correspondence was more distinct on the last two days of the observation when no inoculations were made; but then the fever was considered the result rather of the suppurating thigh than of the lymph. The final dose of 10 milligr. was rather a large one, but no reaction distinctly attributable to it made its appearance. No change.

Harry C——, aged five years eight months, with tubercular abscess (bacilli found) in right inguinal region, presumably from lesions of lumbar vertebræ. Examination of viscera negative. The first inoculation of half a milligramme resulted in a distinct reaction, which showed itself in a rise of temperature and of respiration, not of the pulse. Afterward the reactions were but trifling, or negative, even with a dose of 10 milligr. No improvement.

E——, aged four years eleven months, tubercular disease of left hip; discharging sinus. Examination of viscera negative. Fourteen inoculations between December 13th and January 3d, from one-half to ten milligrammes. The first small inoculations resulted in positive reactions, the temperature rising to nearly 104° F.; the last large ones in none, or none attributable to the remedy. No improvement.

W. C——, aged four years nine months; dorsal spondylitis; kyphosis. Lungs negative. No bacilli were found, and therefore no tuberculosis could be proven. There was, however, a pretty smart double reaction after the first injection of half a milligramme. Very little reaction took place after the subsequent doses, from one to ten milligrammes. Cervical glands became tumefied. Induration and moderate redness of the injection site appeared a day after inoculation in this and the preceding three cases. Reaction, such as it was, took place in from four to fourteen hours. The pulse was more influenced than respiration.

I. T——, aged four years and a half. Cold abscess, probably from right sacro-iliac synchondrosis. Heart and lungs normal. Operations on September 26th and October 13th. Afterward the general condition good. No temperatures. Wound almost healed on December 1st, but his condition remaining stationary for some time, ten inoculations

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were made between December 13th and 30th, gradually rising from 1 to 5 milligr. On January 1st the examination of the boy showed condition generally good, the wound, however, but slightly improved. The first injection of 1 milligr. showed the most marked results; reactions occurred in from ten to twenty-two hours, and grew less and less unless the doses were increased.¹

Auguste M——, aged three. Tuberculosis of left tibio-tarsal articulation. Removal of sequestrum, etc., in September, after that temperature normal, moderate suppuration of fistula, swelling of inguinal glands.

December 11th, one milligr, at 4.45 P. M. After midnight temperature 102°, 102.5°, 102.8° F. As the temperature was still high on the twelfth, I injected only three-fourths milligr. Temperature rose in a few hours to 103.5° F., child somnolent, perspiring. Perspiration continued all night, though temperature was gradually falling.

On December 13th temperature only 100.8° F., less suppuration, no pain. Injected 1½ milligr.

December 14th. Child feels well, suppuration trifling. Temperature 101.2° F.

December 15th. Injected 1 milligr. Sinus is closing.

December 16th. Injected 2 milligr. Perspiration; rhinitis.

December 18th. Injected 3 milligr. No symptoms.

December 20th. Injected 3 milligr. Temperature rose to 103.8° F., and remained above the normal all next day.

December 22d. Injected 4 milligr. Temperature 101.4° F.

On December 24th, 26th, 28th, 30th, and January 2d, injections of 5 milligr. each, with but slight elevation of temperature and improvement in the local symptoms. Within a week after the doses were increased, with but slight increase of temperature, until on January 13th and 16th 10, and on 17th 15 milligr. were injected without a rise of temperature. Four days afterward the child had a temperature of 101° F., a flushed face and a rapid pulse, without any assignable cause, unless it be a retarded effect

¹ A detailed account of these five cases was published in the *Archives of Pediatrics*, March, 1891.

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of the inoculation. On January 27th the fistula greatly improved, not so deep as before, and with less secretion, still not entirely closed. The child in a fair condition.

Elise W——, aged eleven. Cutaneous tuberculosis, admitted December 18th. Family is tuberculous. Child had eczema. Underwent an operation at elbow-joint five years ago. Has an ulceration of the size of a silver dollar on the right side of neck, also one two inches long on chest; lungs normal. Inoculations the only treatment.

December 18th. Injection of 1 milligr. Highest temperature, 101.2° F. Itching on ulcerations.

December 20th. Injection of 1 milligr. 101.2° F.

December 21st. Injection of 1 milligr. Temperature normal.

December 22d. Injection of 2 milligr. Highest temperature, 102.3° F. Epistaxis and headache.

December 25th. Injection of 3 milligr. Temperature, 102.8° F.

December 26th. Injection of 3 milligr. No reaction.

December 27th. Injection of 3 milligr. Highest temperature, 102.6° F. Epistaxis, headache, palpitation.

December 29th. Injection of 5 milligr. Temperature, 100.6° F. Mild collapse. Subcutaneous injection of camphor.

December 31st. Injection of 6 milligr. No reaction.

January 3d. Injection of 6 milligr. Highest temperature, 101.1° F.

January 4th. Injection of 6 milligr. Little reaction.

January 6th. Injection of 6 milligr. No reaction.

January 7th. Injection of 8 milligr. No fever. Epistaxis. Headache.

January 9th. Injection of 10 milligr. No reaction.

January 13th. Injection of 10 milligr. No reaction.

January 16th. Injection of 10 milligr. No reaction.

January 17th. Injection of 15 milligr. No fever. Epistaxis.

January 27th. Injection of 10 milligr. No reaction. On this day the ulcerations were much improved, but not altogether well.

Annie T——, aged nineteen, housewife, admitted Decem-

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ber 13th. Diagnosis: tuberculosis of right knee. Swelling began a year ago; also treatment, with variable results. Father died of consumption. All organs normal.

December 13th. Injection of one milligramme. Pain in the affected knee extending to hip; otherwise no change. On the 14th, swelling and fluctuation appear less.

December 14th. Injection of 4 milligr. Slight pain and redness and swelling at point of inoculation. After seventeen hours temperature, 101.2° F.

December 15th. Injection of 4 milligr. On the 16th highest temperature, 100.3° F. No other symptoms.

December 17th. Injection of 5 milligr. Next day temperature, 100° to 100.3° F. during twelve hours.

December 19th. Injection of 6 milligr. After twelve hours, temperature $100.^{\circ}1$ F.

December 20th. Injection of 8 milligr. After four hours, temperature, 101.4° F.

December 22d. Injection of 10 milligr.

December 30th. Injection of 10 milligr., with a temperature of 100.4° F. twenty-one hours after inoculation.

By some mistake the impression was gained that no reaction had taken place after the several doses, and inoculations were discontinued. They were renewed only after some weeks, when the true state of affairs was found out. At that time the apices also seem suspicious. No improvement.

Daniel D——, aged forty-two, admitted December 12th. Tuberculosis of right elbow-joint. Slight dulness over apices. Eight inoculations were made, of from one to five milligrammes in the course of a month, besides two surgical operations on December 16th and January 7th. The reactions after the injections were very marked, particularly after the first three or four, but the general condition and the total trouble of the patient leave much to be desired.

A——, working-man, forty-three years of age; admitted December 31st. Underwent a resection because of tuberculosis of ankle-joint years ago, with complete recovery. Suppurating fistule in the cicatrix this last month, an inch and a half deep, terminating in carious bone. Over right

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upper lobe, anteriorly, slight dulness and slightly bronchial respiration.

January 6th. Injection of 1 milligr. Temperature normal; pain in joint; headache, dizziness; appetite impaired.

January 11th. Injection of 2 milligr. Temperature, 102.6° F. Severe headache; palpitation; oppression.

January 13th. Injection of 2 milligr. Temperature, 101.4° F., twenty-four hours after injection.

January 16th. Injection of 3 milligr. Temperature, 103° F. Palpitation, headache; feels "as if he were going to die."

Refused to be inoculated. An operation on diseased joint. General condition good.

Elise S——, aged sixty-two. Admitted December 19th. Knee swollen a year ago, is painful and stiff; some cough; some dulness over right upper lobe; universal rhonchi. Temperature, 101.4° F.; pulse, 110.

December 22d. Injection of 2 milligr. After twelve hours, temperature, 103.1° F.; begins to fall six hours after.

December 23d. Injection of 3 milligr. After sixteen hours, temperature, 102° F. Pain in knee.

December 25th. Injection of 3 milligr. No change.

December 28th. Injection of 3 milligr. Temperature, 101.3° F.

December 29th. Incisions into the joint on either side; removal of tubercular granulations. Drainage and iodoform; ether. Purulent secretion from vagina; pain in abdomen.

December 31st. Injection of 6 milligr. The usual increase of temperature.

January 4th. Injection of 6 milligr. After sixteen hours, temperature, 104.2° F.; pulse, 122. Pain; some cough.

January 10th. New operation. More removal of granulations. Fever, dry tongue, intermittent and frequent pulse. Fever and increasing debility; pulse weaker; some cough the following days. Dies January 17th.

Autopsy: Tuberculous knee-joint; large abscess of fifth

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left rib; general miliary tuberculosis of lungs, liver, and spleen.

Ida S——, aged sixteen, caries of vertebræ and ribs. Admitted October 2, 1890. Was well up to two weeks before her admission, with the exception of general discomfort, debility, and emaciation, which had lasted five or six months. Family history, heart, lungs and kidneys negative. She was treated with incisions, scraping of the carious rib, injections of Thiersch's solution and iodoform in oil. Temperature ranged from 99° to 104° F.; pulse 90 to 135. Her general condition improved gradually.

First inoculation of 1 milligr. on December 11th, while temperature was 102.2° F. Next morning temperature, 99.3° F., with pulse and respiration diminished accordingly, and less pus.

December 12th. Injection of 2 milligr. Temperature, 100.4° F., some perspiration; some cough. After sixteen hours, temperature, 99.3° F.; pus much less. After sixteen hours, temperature, 98.7° F.

December 13th. Injection of 3 milligr. Old sites of injections congested and painful. Feels well. Pale face. Next day more pus. Feels improved.

December 14th. Injection of 3 milligr.

December 15th and 16th. Injections of 4 milligr. Secretion less.

December 17th. Injection of 5 milligr.

December 18th. Injection of 7 milligr. Profuse perspiration; thirst; secretion trifling.

December 19th and 20th. Injection of 8 milligr. each. Temperature normal.

December 22d. Injection of 10 milligr. After twelve hours, temperature, 104° F.; pulse 98; headache, restless. Six hours later, temperature, 97° F.

December 25th. Injection of 10 milligr. After twelve hours, temperature, 100.4° F.

December 27th. Injection of 15 milligr. Highest temperature, 100.4° F.

December 31st. Injection of 20 milligr. After sixteen hours, temperature, 100.2° F.; pulse, 120. Face pale, eyes sunken, marked anæmia, but appetite good. Iron.

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No inoculations on January 3d and 5th, with afternoon temperature of 101.4° F.; and pulse, 120.

January 6th. Injection of 30 milligr. Twelve hours afterward, temperature, 101.4° F.; and pulse, 110. Eighteen hours afterward, temperature, 101.1° F.; and pulse 112. Twenty-four hours afterward, temperature, 101.4° F.; and pulse, 112.

Inoculations were discontinued. General condition not changed. Fistula as deep as before, but secretion slightly less, purulent, contains bacilli. High degree of anæmia. Physical symptoms not altered.

Wilhelmine K——, aged nineteen, admitted December 11, 1890, for lupus vulgaris of upper lip, nose, and eyelid. Father died of pulmonary tuberculosis nineteen years ago. She had, when young, conjunctivitis, cervical adenitis, scarlatina, and measles; also eczema capitis. Lupus commenced eight years ago on the nose, and spread to upper lip and part of left cheek. Has been operated upon several times. The lower part of the nose is deformed by loss of substance, the nares impervious; the upper lip shows several hard cicatrices. Some noduli still present. Upper lobe of right lung somewhat dull. No bacilli found in sputum.

December 11th, 4.45 P. M. Injection of 1 milligr. Temperature rose to 100.2° F. within an hour; was subnormal, 97.2° F. within two hours; after five hours pain around site of injection; after seven hours nose and lip congested and with the sensation of tension. Afterward some cough; little sleep. Redness and œdema of nose and cheek very marked within sixteen hours. Headache and dizziness. After eighteen hours, temperature 102° F., pulse 112° F., respiration 26. Nose and lip purplish; pain in chest; chilly, hot, perspiring. After twenty-four hours, temperature, 101.2° F.

December 12th. Another inoculation of $2\frac{1}{2}$ milligr. Pain; cough. Some distinct pustules in the area of lupus. Cough and rigor; temperature, 103.1° F.

December 13th. Itching of nose and lip. Temperature falls some; rises again to 103° F.; normal at 10 P. M. No injection. Still in the night two chills without a rise of temperature, and pain in left shoulder.

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December 14th. 7.30 P. M. Injection of 4 milligr. Temperature rises after nine hours to 104.5° F. within fourteen hours; normal in twenty-six hours. Meanwhile four chills, headache, pain about the chest. Nose and upper lip swelled and congested. Desquamation on nose.

December 16th. Injection of 5 milligr., with the same result as to temperature. Less local congestion, hardly a rigor, the newly-formed pustules and the noduli of lupus much smaller.

December 18th. Injection of 5 milligr.; highest temperature, 102.4° F. Coryza, scales fall off.

December 20th. Injection of 7 milligr.; highest temperature, 102.2° F.

December 22d. Injection of 8 milligr.; highest temperature, 101.7° F.

December 23d. Injection of 9 milligr.; highest temperature, 100.2° F.

December 24th. Injection of 10 milligr.; highest temperature, 99.2° F.

December 25th. Injection of 12 milligr.; highest temperature, 100.1° F. after the lapse of twenty-four hours.

December 26th. Injection of 15 milligr.; highest temperature, 99.9° F.

December 27th. Injection of 15 milligr.; highest temperature, 100° F. after twenty-four hours.

December 29th. Injection of 20 milligr.; highest temperature, 100.2° F. after twenty-four hours.

January 3d. Injection of 15 milligr.; highest temperature, 100° F.

January 5th. Injection of 15 milligr.; highest temperature, 99.4° F.

January 7th. Injection of 25 milligr.; highest temperature, 100.8° F. after twenty-two hours.

January 8th. Injection of 40 milligr. No rise of temperature. After thirty-three hours, 97.4° F. A few hours after the injection an attack of angina pectoris, pain, oppression, fear of impending death. Inhalations of amyl nitrite relieved her.

January 16th. Injection of 50 milligr.; highest temperature, 101.8° F.; pulse, 40.

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January 18th. Injection of 60 milligr., without any reaction.

January 24th. Injection of 80 milligr. Some hours after, without a change of temperature, attack of angina pectoris, face pale, pulse so frequent as not to be countable. Pain and sense of constriction; distinct blowing murmur at apcx. Morphine did not relieve her, amyl nitrite did.

January 29th. Injection of 30 milligr. No change of temperature, but palpitation and pain in chest. After seven weeks' treatment the lupus is very much improved, the deformed nose is of normal paleness, the lips still red in places, some lupus noduli on lip still perceptible, lip still hard, part of this hardness, however, due to old cicatrices resulting from operations. Though there be no cure, the improvement is such, when compared with the results of any operative procedures known, as to be very encouraging.

Amos D——, aged sixty-six, admitted December 31, 1890. Diagnosis: Epithelioma of face, right side (was announced as lupus). Ulceration of face was observed fifteen years ago. Many attempts at a cure. Lately in Chicago arsenic paste, with the result of digging a square large hole into the malar bone which is superficially necrotic, and destroying the external angle of right eye. Normal organs. Insisted upon lymph treatment.

January 1st. Injection of 2 milligr. Eruption began to rise half an hour later. Temperature was 101.2° F. after three hours; fell; rose again, until after twelve hours it reached 101.8° F. It was not normal until thirty-six hours after inoculation. Wound not changed, but eyelids swollen and red.

January 3d. Injection of 2 milligr. Temperature, 100.3° F. four hours after inoculation, and slight rigor.

January 4th. Injection of 3 milligr.

January 5th. Injection of 5 milligr. No increase of temperature; some pain in eye and about the site of inoculation.

January 6th and 7th. Injection of 10 milligr. each.

January 8th. Injection of 15 milligr.

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January 9th. Injection of 20 milligr., after which, on the next day, temperature, 101.5° F.

January 11th and 13th. Injection of 25 milligr.

January 16, 20th, 22d, and 30th. On the 19th he had once a temperature of 100.8° F., but in no connection with an injection.

January 25th. Injection of 40 milligr. Through all these days no rise in temperature, and no local effect. The wound healed slowly under a boric and salicylic acid ointment.

Reactions set in at first as they do in the well, in from one-half to twenty-two hours. This effect was obtained with 2 milligr., while afterward 20 and 40 had no effect whatsoever. There as no apparent effect on, or improvement of, the local lesions attributable to the use of "tuberculin."

James C——, aged forty-one; admitted January 3d, for alleged lupus, which proved epithelioma of the eyelids and temporal regions of left side. It had lasted seven years and had undergone several operations in the last two years. Five milligrammes were injected January 4th, at 4 P. M., at a temperature of 98.4° F. Nine hours later it was 97° F.; fifteen hours, 96° F.; seventeen hours, 98° F. During this time slight fulness in head, pulse smaller and somewhat quicker.

On January 5th injection of 10 milligr. Slight increase of temperature and swelling of spleen on the 6th.

On January 8th injection of 30 milligr. at 9 A. M. Temperature rose soon, and reached 103° F. within ten hours. Lymphatic glands enlarged on the side of his chest, which were quite painful.

January 11th. Injection of 40 milligr. Temperature rises only to 100.2° F. Feels perfectly well.

January 15th. Injection of 50 milligr., with no effect whatsoever.

January 18th. Injection of $33\frac{1}{3}$ milligr. No effect.

January 21st. Injection of $66\frac{2}{3}$ milligr. Temperature eight hours after, 101.4° F.; otherwise no effect either local or general.

January 25th. Injection of $87\frac{1}{2}$ milligr. No effect at

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all; complains, however, on the 26th, that his bones ache and his shoulders are lame. Better on the 27th.

January 28th. Injection of $72\frac{1}{2}$ milligr. No effect, and the ulcerations in about the same condition as in the beginning; some new granulations on the edge of lower eyelid. No improvement.

A child nineteen and one-half months of age was inoculated in the very last stage of tubercular meningitis on December 12th, with one-half of a milligramme, on the 13th, with one milligramme of "tuberculin." There were no changes in her hopeless condition attributable to the injection.

E. R.—, boy aged eleven, admitted October 23d, with tubercular peritonitis and ascites. Disease began six months previously, with frequent but moderate pain, but no fever or rigor. Convulsions of intestines are easily distinguished (adhesions). Constipation. Never a temperature beyond 99.5° F., never one below 98° F., until December 26th, when the first milligramme was injected at 6 P. M. Temperature at 9 P. M. was 97.8° F.; pulse 80. At 12 M. on the 27th, 97° F.; pulse 88. At 3 A. M., 101° F.; pulse 100. At 6 A. M., 102° F.; pulse 120. At 9 A. M., 103.3° F.; pulse 114. At 12 M., 101.6° F.; pulse 116. At 3 P. M., 101.8° F.; pulse 112. At 6 P. M., 102.2° F.; pulse 116. At 9 P. M., 100° F.; pulse 108.

The first temperature of 99° F. was reached at 3 A. M. on the 28th, at noon it was again 97° F., still with a pulse of 106. Second inoculation of 1 milligr. at 6 P. M.; only rise (101.2° F.) at 9 P. M. On the 29th at 6 P. M. 2 milligr. also on the 30th. No rise, several times 97° F. On January 2d, 3 milligr. at 6 P. M. At 9 and 12 P. M., and at 3 and 6 A. M. on January 4th the temperatures were 97.8° F., 97.4° F., $97-98^{\circ}$ F. No rise.

January 4th, 6 P. M., injection of 3 milligr. Temperature at 9 P. M., 96.5° F.; at 12 M., 97° F. 3 A. M. of the 5th 99.4° F.; 6 A. M., 100.3° F.; the only rise. That night temperature for many hours was 97° , 96.2° , 96.9° F.

January 6th at 6 P. M., with a temperature of 97.3° F.,

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5 milligr. were inoculated. For twelve hours afterward temperature was between 97° F. and 96.2° F. No rise except once, to 100° F., at midnight of January 8th. This was the only time when the pulse was as low as 70.

On January 10th 10 milligr. were injected, temperature sank again to near 96° F., as heretofore, rose and fell once at midnight of 13th to 95.8° F., with a pulse of 62.

On January 16th with a temperature of 97.2° F., at 6 p. m., 10 milligr. were injected. The first effect was again a fall to 97.8° F., and 97.2° F.; then at 3 a. m., a rise to 102° F., and pulse 116. At 6 a. m., 99.4° F.; pulse 108. At 9 a. m., 101.2° F.; pulse 120. At 12 m., 102° F.; pulse 122. At 3 p. m., 99.6° F.; pulse 108. At 6 p. m., 100.6° F.; pulse 130. After that the temperature fell, with the exception of midnight the 19th, when it was once 101° F. It then fell a few hours, rose again in the morning hours of the 20th and remained twelve hours from 100.2° F., to 101.7° F.

On the 23d, about noon, I made an inoculation of 20 milligr. At 6 p. m., temperature was 104.4° F., with a pulse of 112. All next day it remained above 100° F. He left the hospital on the 26th. During all these weeks he felt very comfortable except when under the influence of high temperatures, and his general condition improved. Still, it had improved before the lymph treatment was begun; his strength increasing and ascites diminishing.

M. C.—, aged five years and six months. Tubercular peritonitis, ascites. Was said to have been sick a week with tumid abdomen and loss of appetite. For some days after admission the highest afternoon temperature was 100.5° F., morning temperature as low as 98.4° F. First inoculation of half a milligramme at 8.45 p. m. on January 3d. Within five hours the temperature was 103.2° F.; pulse 148; respiration 30. The temperature rose to 104.5° F., and the accompanying symptoms became so alarming that phenacetin and brandy were administered several times. Not before the 6th was the temperature again below 100° F. After the next inoculation reactions would always show themselves, but the ef-

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fect grew less gradually, though the doses were increased from one half to 2 milligr. Very suddenly and unexpectedly, eighteen days after the treatment was begun, the temperature rose again to 104.6° F., with corresponding rise of both pulse and respiration. No particular change in the three weeks she was in the hospital.

The following are a number of cases of pulmonary tuberculosis in different stages:

Mrs. R——, twenty-five years of age. Admitted December 17th. Singing lessons from seventh to seventeenth year; hæmoptysis at seventeen; acute pulmonary complaint two years ago and a year ago. For eight years occasional dyspnœa, cough, and expectoration. Left upper lobe, extensive dulness and coarse respiration; right lower lobe, local dulness and rhonchi. Bacilli.

December 18th. Injection of 1 milligr. at 6 P. M.

December 19th. Slight rigor in afternoon, with temperature of 101.3° F., and perspiration; 9 P. M., 102° F. (highest temperature). Pain in site of inoculation. First normal temperature returned December 21st at 9 A. M. At 12 M., 1 milligr. After twenty-four hours, December 22d, 9 A. M., 100° F. Spleen enlarged. Highest temperature at 6 P. M.; at 9 P. M., below 100° F. Headache all day. December 23d some cough. At 12 M. temperature 100.2° F.; 6 P. M., 100.6° F.

Injection of 2 milligr. at 7 P. M. on December 24th; 2 milligr. the 26th; 3 milligr. the 29th; 4 milligr. the 31st; also the 2d, 4th, and 6th of January. The highest temperature on the 25th was 101.4° F.; the 27th, 102° F.; the 30th, 101.2° F.; January 1st, 100.7° F.; January 3d, 103° F.; the 5th, 102.4° F.; the 7th, 99.4° F. These temperatures were reached in from sixteen to twenty-two hours after inoculation. During all this period her general discomfort, local pain, cough, and perspiration became lessened.

Inoculations were made on the 8th, 6 milligr.; the 9th, 7 milligr.; the 11th, 8 milligr.; the 12th, 9 milligr.; the 14th, 10 milligr.; the 16th, 11 milligr.; the 17th, 13 milligr.; the 18th, 13 milligr.; the 21st, 23d, and 24th, each 15 milligr.; the 25th, 20 milligr.; and the 26th, 25

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milligr. During all this time her general condition improved; her temperature was mostly between 98.5° and 99.5° F., and seldom rose to 100.2° F.

John H——, aged twenty-eight, admitted January 15th. Tuberculosis pulmonalis et laryngis. Family history of phthisis, of which a brother and a sister have died. Hoarseness, dry throat, and occasional hæmoptysis more than two years ago. Permanently sick for a year, cough, some expectoration in the morning. Both increased three weeks ago. No pain, fever, or night-sweat. Short breath on exertion. Condition fair. Some retraction of left supra- and sub-clavicular region, dulness, crepitant râles down to third rib; posteriorly the same. About the middle of thorax some bronchial or prolonged expiration, a similar condition on the right side on percussion and auscultation.

Inoculations on January 15th, of 1 milligr.; January 16th, of 2 milligr.; 17th, of 3 milligr.; 18th, of 4 milligr.; 20th, of 6 milligr., had no visible effect whatsoever, the rectal temperature remaining at 99.6° F.

On the 21st, 10 milligr. were injected, with the result of raising the temperature to 103° F. within five hours and producing much cough. On the 25th, 5 milligr. were injected, the 25th, 10 milligr.; the 26th, 15 milligr., with no response on the part of temperature. It is probable that the dose of 10 milligr., if it had been the first, would have had the same result, and that this effect would have justly been claimed as pathognomonic for tuberculosis; though a later dose of $1\frac{1}{2}$ centigr. did not in the least show the same effect. Six milligrammes, however, elicited no temperature response; while other cases respond to smaller doses so readily that, if larger doses were given to them, danger might be incurred. Thus for instance:

E. V——, aged twenty-five, with undoubted pulmonary tuberculosis, dulness, bronchial respiration, purulent expectoration, bacilli, and night-sweats, had 1 milligr. injected on January 25th, with no result; another on January 26th, with an increase in temperature, which reached its maximum, 101.8° F., after fifteen hours. In this case it is remarkable that the second effective dose was not larger than the first which refused its effect. Still, it is possible

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that the reaction following the first inoculation occurred only after more than a day after—in accordance with some other observation of the same kind.

G. P——, aged thirty-two, admitted December 11th, with the diagnosis of incipient tuberculosis of the lungs. Had dulness and crepitant râles over clavicle and suprascapular region of the right side. Respiration over fossa supraspinata diminished. Sputum not copious, but contains bacilli. Weight, 127 pounds.

Inoculation of 2 milligr. on December 12th; 3 milligr. the 13th; 4 milligr. the 14th; 4 milligr. the 15th. Temperature rose to 101.6° F. in twenty-two hours. Injection of 5 milligr. on the 17th with no visible effect. Patient weighs 137 pounds on the 19th. Injection of 6 milligr. on the 20th was followed by a temperature of 102.4° F. on the 21st; 6 milligr. on the 23d by 101° on the 24th; 7 milligr. on the 25th by 101.8° on the 26th; 7 milligr. on the 28th by 101.2° on the 29th; 9 milligr. on the 30th by 101° on the 31st.

On January 1st no inoculation, and no temperature above 100° F. (This but once.)

On the 2d of January a new start was taken with 2 milligr., and thirteen inoculations were made up to the 19th, when the treatment was discontinued. Meanwhile the doses had been gradually increased to 10 milligr. But twice was there a temperature as high as 100° F. during that time. The general condition improved from day to day, and about the end of the month the patient was discharged in good health, without cough, and without any râles and any dulness. Recovery (?).

J. W. B——, aged twenty-five, tuberculosis pulmonum. Father died of consumption; patient had symptoms these several years. Bronchial respiration over the upper lobes both right and left posteriorly, also slightly over the left lower lobe; loud bronchial respiration over left upper lobe in front; moderate dulness over total right side. From December 20th to the end of January, when she left, twenty-two inoculations were made, ranging from 1 to 15 milligr., the latter dose being given four times. The first rise of temperature occurred on December 26th, after a

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dose of 3 milligr. on the 25th; the first temperature of 102° F. was reached January 10th after a dose of 7 milligr. had been given twelve hours previously. The same was reached again on January 26th, sixteen hours after the fourth dose of 15 milligr. (the first on January 20th) had been administered; also on January 27th, sixteen hours after 15 milligr. on the 26th. It must be added, however, that after the temperature had come down to 98° F. in the early morning hours of the 28th, it rose to 102.9° F. in the afternoon. Thus it remains doubtful whether the higher temperatures of the afternoon (mostly sixteen hours after inoculation) were due to the injection or to the pulmonary process. For when the patient left about the end of January, her claim of feeling improved was not justified by either increase of weight or any appreciable change in her lungs.

M. P——, aged twenty-one, admitted December 12th. Tuberculosis pulmonum et laryngis. Color of vocal cords grayish red; edges eroded, fossæ Morgagni ulcerated, posterior wall of larynx slightly thickened. Extensive rhonchi over chest, dulness below right clavicle. Bacilli numerous. Inoculations were made, December 13th, 1 milligr.; 14th, 2 milligr.; 16th and 18th, 5 milligr. each; 21st, 6 milligr.; 23d, 25th and 28th, 5 milligr. each. Reactions were quite marked after the first inoculation, though they required nearly a day for their maximum. Cough, expectoration and temperature increased, larynx became sensitive. At no time was the temperature anything like normal. Examination on December 26th revealed: No change in larynx, complete aphonia; over left upper lobe dulness, coarse respiration, moist and sibilant râles over apex cavernous breathing; over almost the whole right lung bronchial respiration, and moist and sibilant râles. As his condition was so much impaired, I hesitated giving the same doses, being under the impression that possibly the injection might add to his high temperatures and the extension of the morbid process. Therefore after waiting five days, during which the general condition and the temperature of the patient showed no difference from former observations, I injected 2 milligr. on January 2d.

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The last injection of this new series, which consisted of fourteen inoculations of from 2 to 5 milligr., was made on January 20th. No perceptible effect. Death on January 25th.

M. A——, aged nineteen, admitted January 7th. Pulmonary tuberculosis. Began with a pleurisy, October, 1889. Languor, cough, fever, night-sweats last spring, expectoration with bacilli, but seldom in bed. Right upper lobe has prolonged expiration and sibilant râles. Left normal. Posteriorly, over right apex, wheezing and moist râles. Some dulness over right upper lobe, anteriorly.

Inoculations were begun January 9th, from the 9th to the 19th. They were repeated daily, commencing with 1 milligr., and gradually rising to 9 milligr. From January 21st to 29th eight inoculations were made, each of 10 milligr. During all this time no improvement took place; she coughed but little, with exceptions, perspired, felt often languid, expectorated some, slept well most of the time. During the first week (sixth day) the temperature reached 102° F.; but once, toward the end of the second week, it reached 102.5° F., touched 104.5° F. several times in the third, and more in the fourth week. Toward the end of the month the temperature fell below 103° F. Meanwhile, though the patient's râles would increase from time to time, the dulness did not extend; still, her general and local condition did not improve.

A. H——, aged twenty-one, admitted December 29th; tuberculosis pulmonum. Had pneumonia a year ago; coughed almost all the time since with the exception of some months passed in the mountains. Dulness over both apices (mainly left), both anteriorly and posteriorly. Rhonchi over both upper lobes, in some places during cough only.

Inoculations: December 31st, $\frac{1}{2}$ milligr.; January 1st, 1 milligr.; January 3d to 7th, four inoculations of 2 milligr. each; January 9th to 25th, a daily dose of 3 milligr., with the exception of the 14th, 19th, and 22d; January 26th, 4 milligr.; 27th and 28th, 5 milligr. each; 29th, 6 milligr.; 30th, 7 milligr.; 31st, 8 milligr. After the smallest doses the temperature would rise, sleep was rest-

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less, there were headaches and mild chills, also much perspiration, also palpitation. The temperatures till January 22d varied from 101° to 103.5° F.; in very rare instances only would they fall below 100° F. In the last week of the month, however, most observations showed temperatures below 100° F., many below 99° F., very few as high as 101° F. About that time, her general condition, which had not been good at all, improved very much indeed.

I——, a girl aged five, with undoubted pulmonary tuberculosis, slight fulness over left lung both anteriorly and posteriorly, and higher pitch in right side than left, but no râles, had her first inoculation of 1 milligr. on January 6th. The case is remarkable for its punctual reactions. Within four hours, once after two, the temperature would rise without affecting either pulse or respiration after the first two injections. Only with the third, and every subsequent injection, both pulse and respiration rose correspondingly. The reactions lasted about twenty-two hours, a little less than one-half of this time being spent on the rise. Respiration, with a single exception, returned more readily to the normal than the pulse, which remained accelerated for some time. Still, when a sufficient time was afforded, temperature, pulse, and respiration returned to the original condition previous to any inoculations. Not improved in three weeks.

S. S——, aged thirty-two, pulmonary tuberculosis, with infiltration of both upper lobes. The first injection of 1 milligr. appeared to have but little effect, the third of 3 milligr. given two days afterward increased his temperature within six hours. The maximum was 101.8° F., and was reached twenty-four hours after. Normal temperature on the following day (January 14th). On the 15th 3 milligr. with rise of temperature within twelve hours; maximum of 102.6° F. within eighteen hours; at the same time perspiration, cough, great discomfort. On the 18th, 3 milligr. were again given without any such effect. Five milligr. on the 20th increased the temperature within six hours to a maximum of 103.9° F. within nine hours. The same dose on the 23d had no similar effect. But when

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given on the 25th it had again the effect of raising the temperature within seven hours, with a maximum of 103.8° F. within nineteen hours. It appears, therefore, that the same dose may lose its effect, and recover it at a later time, the intervals between the several administrations being the same, viz., two days.

F. T——, aged thirty-six. Pulmonary tuberculosis. Had fifteen injections from December 28th to January 31st, in doses of from one to eight milligrammes, with but little reaction and little effect. The smaller doses appeared to prepare the patient for readily tolerating the larger ones.

J. F. L——, aged thirty-nine. Pulmonary tuberculosis. Had a pneumonia nearly two years ago, and never lost his dyspnœa. For five months past, cough, expectoration, emaciation, night-sweats, bacilli. Over upper halves of both upper lobes, dulness, and crepitant râles. Thirteen inoculations between December 17th and January 6th, amounting to from one to twenty milligrammes. The latter dose was repeated on the 16th and the 20th, a few days after he left the hospital. The brief observations permitted resulted in the following: The third inoculation (first of 3 milligr.) was the first that raised the temperature to 102.8° F. at 9 A. M. and 102.5° F. at 12 M., fourteen and seventeen hours after the inoculation. Nearly the same temperature was reached three and six hours after the next inoculation of 5 milligr. It was never reached again, either spontaneously or after increased doses. Indeed, there appeared a gradual downward tendency from day to day. The general condition certainly improved, and he gained a few pounds.

A. B——, aged thirty-three; admitted November 25th. Pulmonary tuberculosis. For a year and a half past, cough, four attacks of hæmoptysis, expectoration, night-sweats, emaciation, hoarseness. Bacilli. Family history negative. Supra- and infra-clavicular regions retracted. Dulness over both apices, also diminished respiration and some rhonchi. Over right lower lobe, posteriorly, dulness and bronchial respiration. During December, fifteen injections of from 1 to 10 milligr.; in January, seventeen of from 2 to 50 milligr. After the first inoculation the patient

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coughed much, both cough and expectoration grew less after the second, and remained so. At no time was there a temperature which had to be attributed to the action of the lymph; it seldom reached 101° F., then only in the afternoons (about a day after the injection) and for a short time. Within a week the patient felt better. Still, the examination of his chest made on December 26th revealed no changes except the disappearance of the rhonchi. During January, temperature almost normal; but little cough and expectoration. Increase of weight in one month, nine pounds. General improvement.

A. H.—, aged thirty-nine, admitted December 4th with dulness over both apices and crepitant râles, and bronchophony over right apex. Bacilli. From December 13th to the end of the month thirteen injections were made of from 1 to 10 milligr. During the course of January sixteen injections were made, from 2 with rapid increases to 60 milligr. The first injection of 1 milligr. raised the temperature of 98.5° F. to 105° F. within an hour and a half, with intense perspiration, followed by a rapid fall afterward to 99° F. Maximum temperature in the afternoon of the 12th, 101.7° F.; of the 13th, 101.2° F. At that time 3 milligr. were injected, with no increase of temperature or any other signs of reaction. No such temperature was ever reached again, and the patient felt more comfortable from day to day. Still, the physical condition of December 26th revealed dulness posteriorly over left upper lobe, with considerably increased voice. On the right side bronchophony posteriorly over upper lobe, dulness over the two upper lobes. Temperature remained normal throughout January, weight increased by twelve pounds, cough became less, also expectoration, crepitant râles disappeared, dulness remained. Great improvement in the general condition.

In some cases of tuberculosis small doses of the lymph appear to reduce the temperature without giving rise to any other symptoms except the sensation of comfort. Patients will apparently not react on the administration of 1 milligr., then the dose is increased from day to day, slowly; the later doses will not affect the system any more than

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the first; indeed, 10 milligr. the tenth day is attended with the same lack of consequences as 1 milligr. given the first day, in accordance with the fact that when a serious reaction is experienced after a single milligramme has been administered, very much larger doses are soon required to accomplish the same end.

A lady, aged thirty-five, Mrs. M——, mother of a number of children, one of whom died a few years ago of miliary tuberculosis, had tuberculosis of the lungs and abdominal lymph-bodies, probably also the peritoneum, these ten years. The abdominal symptoms were very much improved compared with what they were a few years ago. But for years she has expectorated, coughed, was emaciated, formed large cavities in both apices, both of which have diminished in size for a year past, has had numerous attacks of pleuritis and pneumonia, and brings up bacilli in almost every sputum. Besides the extensive cavities she has large areas of dulness and coarse respiration, besides all kinds of rhonchi. Lately she had a severe pneumonia of which she got fairly well. Still, she went on with her old symptoms, and high fever, which required repeated large doses of digitalia and antipyrin.

The first milligramme was injected January 25th while she had a temperature of 101.8° F., which fell as low as 99° F. January 26th it rose in the morning to 100.4° F. Injection of 2 milligr. at that time. Temperature sank to 98° F. Next morning again 100.4° F. and 3 milligr. Again 100.4° F. and 4 milligr. on the 28th; on the 29th the same and 5 milligr; on the 30th the same and 6 milligr. in the afternoon. For the first time this week she had a temperature of 100.8° F. in the night through the course of a few hours. The following morning, January 31st, temperature below 100° F.; 8 milligr. at noon. First elevation twenty-four hours after, on February 1st, 100.5° F., rose to 100.8° F., was 100° F. again at 6 p. m., and fell below. Through all this week there was less cough, less expectoration, less perspiration, more appetite and comfort, in spite of the three daily doses of medicine being reduced to one, and that one reduced in size.²

² Four weeks have elapsed since. There has been some after-

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A similar observation was made in E. L——, aged nineteen, admitted December 25th. He had been sick in bed seven weeks, his condition had been carefully watched, and temperatures recorded. They were seldom as low as 101.5° F., mostly from 102° F. to 104.5° F., and sometimes higher. Has been reduced to $102\frac{1}{2}$ pounds. Dulness and fine rhonchi, crepitant and sibilant over the left upper lobe, also bronchophony. Over the right upper lobe posteriorly, over large area, dulness, rhonchi, crepitant and sibilant, and bronchophony; anteriorly; dulness, bronchial and cavernous breathing, and rhonchi. Bacilli. Had twenty-nine inoculations from December 25th to February 27th, the latter day 5 milligr.; all the rest from 1 to 4 milligr., with a slow increase. On December 27th, the first temperature of 100° F. was reached, the lowest in seven weeks; 99.8° F. on the 28th; 99.4° F. on January 2d; 99° F. on the 3d, 9th and 10th; 98.4° F. on the 14th; 98.6° F. on the 22d. All this occurred while his local symptoms did *not improve*. On the contrary his cavity in the right apex is increasing in size, expectoration still copious and bacillary, though more fluid. Lately he has again temperatures of 102° F., and even 103° F., which cannot be taken as the result of lymph-action, but are undoubtedly the outcome of the destructive process, which is not checked. This case shows that the patient may feel very much improved without an actual change in his pathological condition, even while getting worse.³

E. A. B——, aged thirty-three, admitted January 3d. Since January, 1890, loss of weight (now $152\frac{1}{2}$ pounds) and

noon rise of temperature every day which could be controlled by a daily dose of digitalin and antipyrin. Meanwhile daily doses of tuberculin have been injected; they reach at present a decigramme without the slightest feverish reaction. The cough is reduced to one-fifth of what it was, expectoration is much less and easier, the râles are audible on one side only, large areas have their vesicular respiration restored to them, and the weight of the body has increased by more than six pounds.

³ In the course of the last few weeks, the general condition of the patient improved sufficiently to enable him to take long walks.

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strength. For some months past hoarseness. The posterior wall of larynx hyperæmic; left vocal cord unhealthy, will be described later on. No night-sweats. To those who saw him before admission, he looked feverish. Being a doctor, he never took his temperature. Right lung over clavicle: Dulness and during cough crepitant râles; posteriorly crepitant râles over the whole upper lobe. Left lung: Dulness trifling over clavicle, slightly coarse respiration. Between January 3d and 13th, ten inoculations were made, from 1 to 10 milligr., increasing by 1 milligr. from day to day; on the 14th, 10 milligr.; 16th, 17th, 18th, 15 milligr.; 20th, 20 milligr. The injections were made about 7 p. m., the only temperature above 100° F. would be found in the afternoons, the highest ever noticed being 100.8° F., and that only once; low temperatures were observed, down to 98.2° F. On several days the temperatures never reached 100° F. During all this period no bacilli were found, and therefore I stopped the inoculations on January 20th, when the last one of 20 milligr. was made. On that day the highest temperature was 100° F.; on the 21st, 100.1° F.; a single time, the 22d, 100° F.; a few evening hours, the 23d, over 100.8° F. very exceptionally. On that day the sputum, which was always scanty, was again examined, and a large number of bacilli found, many of them broken up as described in *Deutsche Med. Wochenschrift*, No. 46. At 11.10 a. m. 25 milligr. were injected. At midnight the temperature was far below 100° F., and remained so (down to 98.6° F.) until 9 p. m. on the 24th—indeed the first day when there was no increase in the afternoon. On the 24th, at 8.30 p. m., 30 milligr. From 6 a. m. to 9 p. m. the 25th, temperature from 100° to 100.7° F., the first indications of a response such as every healthy person would show. The same occurred after 40 milligr., which were injected at 8.25 p. m., the 25th. Temperature rose, 9 a. m. on the 26th, to 100.3° F., reached 101.4° F. at noon, and was below 100° F. late in the evening. Two days later 60 milligr. were injected with no more marked result.

That case shows conclusively that the lymph did not cause any reaction pointing to the presence of tuberculo-

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sis when injected in doses varying from 1 to 60 milligr. The slight responses met with in these high doses may be found in the healthy. Besides, the case is noticeable as one of those in which bacilli may not be found for some time and still be present. The question whether the bacilli were freed by the action of the lymph must be answered in the negative; for there were no marked rhonchi during the period of inoculations, and we have a right to conclude that the tissue surrounding the bacilli nests was not congested and softened by the action of the lymph.

This case is interesting from an additional point of view. On January 8th there was a flat, slightly granulating ulceration of the posterior half of the left vocal cord, paresis of the adductors, the whole mucous membrane quite pale. On the 22d two-thirds of the ulceration had closed, paralytic symptoms improved, the mucous membrane just as pale as before. There was no local reaction at any time after an administration of lymph, all of which shows that not only the general but also the local reaction may fail, but still a local improvement may take place.

In the case of H. C——, aged nineteen, admitted December 15th, similar observations were made, though not so conclusive for the following reason. He had been sick with cough, purulent and bloody expectoration nine months, was emaciated, feeble, and feverish. There were dulness, crepitant and sibilant râles, coarse respiration, bronchial respiration over both upper lobes. Bacilli copious. The first inoculation of 1 milligr. was made on the 15th, the 9th of 9 milligr. on the 25th, with the result of reducing his temperature. He entered with temperature 103° F., which he did not reach again. Indeed, most of his temperatures were below 100° F., once 98.6° F., reached 101° F. but seldom, and were 101.7° F. but twice, and for a short time only. Two days after the first inoculation he slept well in the night, perspired less, cough but trifling, feels comfortable. But after the sixth injection, on the 20th (7 milligr.), cervical and axillary glands and a long string of lymph-bodies were found swollen and painful on both sides of chest. On the 26th

I stopped the inoculations because those lymphatic glands were increasing considerably, and in spite of the lowered temperatures the general condition of the patient was bad. On the first day when no injection was made, his temperature rose to 102.5° F., the next to 102.4° F., the third, 103.1° F.; the fourth, 104° F.; the fifth, 103.7° F.; with general malaise, vomiting, and some albuminuria; the sixth, 103.6° F.; the seventh only 101.7° F.; the eighth, 102.1° F. But there were some temperatures below 100° F., and his general condition was better, the glands also smaller; thus I resolved to keep him as I thought under the constant influence of the powerful remedy by giving a daily dose of only 2 milligr.; this has been repeated sixteen times up to January 19th. When the first 2 milligr. were given there was no longer any albumin in the urine. The temperature decreased gradually, the periods of less than 100° F. became longer, on the 8th it did not rise at all beyond 101° F., and did not reach this figure at all between the 9th and 14th. On the 19th, when no inoculation was made, 102.1° F. was again reached, through five or six evening hours. His general condition is not improved; has left for the South.

E. S—, aged thirty-two, admitted December 16th, with the diagnosis of tuberculosis pulmonum. Bacilli have never been found, there being very little sputum. But has coughed these two years, had night-sweats, and some fever these four weeks. No history of tuberculosis in the family. On the right side dulness and fine crepitant râles over the clavicle, also below. Posteriorly the same. Over the lower right lobe diminished respiratory murmur and some dulness. On the left side, above and below the clavicle and in the suprascapular region, some crepitant fine râles during cough. This patient proved peculiarly immune against the effect of the lymph. He entered with a temperature of 101° F., and over, but never reached it again, seldom 100° F., was more frequently 98° F. than 99° F., and reached 97.2° F., lymph or no lymph. On December 1st, 1 milligr., and further on 2, 3, 5, 6, 10 (on the 30th), again on January 3d, 20 on the 8th, 25 on the 10th, 30 on the 14th, 40 on the 16th, 20 on the 23d and 25th;

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50 on the 26th, 60 on the 27th, 70 on the 29th, 80 on the 30th. The doses were more than large enough to affect a healthy person. If it were not for the negative result of the search for bacilli, there would be no doubt in regard to the diagnosis. I do not feel, however, that I have a right to deny the presence of tuberculosis in the presence of all symptoms except bacilli. I have spoken of a case in which a two-weeks' search for bacilli was in vain, and still they were present. Here, then, is an individual who in that condition is not affected by 360 milligr. administered within a week. Are we to call this absence of an effect the result of an idiosyncrasy? Though that term does not mean much and be only an expression of convenience, it shows that there is an occasional person that is not affected by a reasonably large dose of the lymph.

The condition of the patient is very much improved. Dulness has disappeared and there are no rhonchi. Evidently the pulmonary tissue has expanded, and the secretion stopped entirely. Improved, perhaps well.

CONCLUSIONS.—After an inoculation of tuberculous patients with tuberculin the temperature of the body would rise in from two to twenty-eight hours. Or it would not be influenced at all, in a few cases. Or it would fall first and then rise some. Sometimes it would rise, then fall and again rise. Still the rise is the usual occurrence. The descent from the maximum would in most cases take a longer time than the ascent. Unexpected rises of temperature were occasionally met with in inoculation of persons not tubercular. Perhaps there are other conditions besides tuberculosis in which tuberculin has the same effect. It is therefore not absolutely reliable in ferreting concealed tuberculosis. As a means of diagnosis it is not positively infallible. The doses required to obtain a reaction would vary considerably. Some patients would respond readily to a milligramme, some demanded ten times that amount. Children required relatively large doses, except the cases of tubercular peritonitis. One of them, at one time, after having shown high temperatures following previous inoculations, had a rectal temperature of 95.8° F., with a pulse

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of 62. The nature of the cases—whether bone, gland, skin, or lung—did not influence the effect of the doses. Lupus and pulmonary tuberculosis would be influenced by very small, or sometimes by large doses only. Therefore it is not safe to begin anywhere with 10 milligr., as has been advised, particularly as possibly the reaction may be retarded, and a second inoculation may have a cumulative effect. The therapeutic effect did not appear to depend on the energy of the reaction; on the contrary, some of the most favorable cases were those in which no, or very little increase of temperature was observed; while others, which exhibited high fever, and other symptoms of reaction, were endangered by dyspnœa, rhonchi, and the progress of local disturbance in the lungs. It seems advisable to begin with small doses in every case, and rather avoid than covet striking effects. At all events it is impossible to predict or calculate the effect of the remedy. Every case appears to require its own tentative treatment.

Other results of the inoculations were changes in pulse and respiration. In some these would correspond with the rise of temperature; in a few they would not be influenced. Sometimes the pulse, other times respiration would be more readily affected. The comfort or discomfort of the patient would not always be in accordance with the variations of temperature, pulse, or respiration. The site of the induration would sometimes smart, and flush after a while; indurations there were but few, abscesses none, local erythema extending beyond the site of injection a few, general eruption but one. No erysipelas. We have observed pain in the diseased part, in other limbs, swelling of glands sometimes in distant parts, perspiration, headache, rigors, languor, insomnia, palpitations, angina pectoris, nausea, increase of appetite, very slight jaundice, albuminuria in a few cases, increase of cough, diminution of cough, dyspnœa, rhonchi on expected and unexpected places, new regions of dulness, more expectoration—mostly in the beginning of treatment, change of its purulent into mucous character, increase or mostly decrease of secretion from accessible tuberculous parts, swelling of spleen and a peculiar form of glossitis in a few cases.

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The results of, or events after, a protracted course of inoculations, may briefly be summed up as follows:

Tuberculosis of right knee. No change.

Dorsal spondylitis. No change.

Tubercular abscess in right inguinal region. No improvement.

Tubercular disease of right hip. No improvement.

Tuberculosis of right knee. No improvement.

Tuberculosis of right elbow. No improvement.

Tubercular ankle-joint, fistula. No improvement (in sixteen days).

Tubercular knee-joint. Death from miliary acute tuberculosis.

Caries of vertebræ and ribs. No improvement.

Cold abscess from right sacro-iliac synchondrosis. Slight improvement.

Tuberculosis of left tibio-tarsal articulation. Improvement.

Cutaneous tuberculosis. Great improvement.

Lupus vulgaris of nose and lip. Great improvement.

Epithelioma of right temple and face. No improvement.

Epithelioma of left temple and eyelid. No improvement.

Tubercular meningitis, almost moribund. No change.

Tubercular peritonitis. Two cases. Not influenced.

Pulmonary tuberculosis. Five cases. Improved. One of them relapsed and got worse.

Pulmonary tuberculosis. Four cases. Much improved.

Pulmonary tuberculosis. Two cases. Disappearance of local symptoms. Recovery. (Bacilli found in one.)

Pulmonary tuberculosis. Four cases. Not improved.

Laryngeal tuberculosis in one of these much improved.

Pulmonary tuberculosis. One case. Died. Laryngeal ulcerations much improved.

I repeat: Of eleven cases of tuberculosis of bones and joints, eight were not improved, one died, two were improved.

Two cases of epithelioma not improved.

Two cases of cutaneous tuberculosis (one lupus) greatly improved.

Tubercular meningitis and peritonitis not influenced.

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Of sixteen cases of pulmonary tuberculosis one died, four were not improved, five were improved, four were much improved, two recovered, even with disappearance of local pulmonary changes.

The two cases complicated with laryngeal tuberculosis did not thrive. One was not improved, one died. But in either the laryngeal ulcerations improved.⁴

I do not wish to compare these results with any other statistics, but offer them simply as contributions to the general stock of observation. The number of favorable cases of joint and bone tuberculosis strikes me as small, of pulmonary tuberculosis as large. When I ask myself what became of sixteen average cases of pulmonary tuberculosis admitted to our hospitals, before the inoculation epoch, the answer is very discouraging. It is true that most of the patients whose cases have been detailed above were placed in better conditions than ever before, and thus were given a more favorable chance for improvement. But so were all those who were admitted with tuberculosis any season, and any year; with hardly any resting place awaiting them but the dead-house.

Altogether, tuberculin has proven a remedy of great power for good, and for possible evil. It required credulous people believing in miracles to expect the impossible, and it took all the accumulated ignorance of centuries to believe in the possibility of reversing the rules of nature, which is as impartial in restoring as it is pitiless in destroying, subject to irrevocable laws. When great genii like Pasteur and Koch enrich the world with new discoveries in the fields of pathology and therapeutics, even then we must not look for infallibility. Tuberculin has been heralded as witchcraft by sensationalists. What it has done, and can do, is more than any other remedy—except climatic treatment in pulmonary tuberculosis and surgical interference in select cases of local tuberculosis—has succeeded in accomplishing. From what little I have observed it would appear that the next future of successful

⁴ A number of cases treated have not been accounted for, for the reason that the time of observation was too brief to yield any reliable result.

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treatment of pulmonary tuberculosis consists in the combination of climatic cures with the careful and persistent use of tuberculin. That is what we have to be thankful for even at this early date. At all events it is more becoming to honor our great men by appreciative criticism than to apotheose them first and exile them afterward. The former is the way of professional intellect and decorum, the latter that of a whimsical and flighty personal "government."⁵

⁵ To the house staffs of the German, Foundling, and Skin and Cancer Hospitals, I herewith express my appreciative thanks for their many and persistent labors connected with the accumulation of facts referring to the inoculations. They were indeed labors of love, with all of them.

GUAIACOL IN THE TREATMENT OF PULMONARY TUBERCULOSIS

GUAIACOL, an ethereal product of beechwood which is soluble in two hundred parts of water, was first recommended for its efficacy in tuberculous processes, in 1880, by Professor Max Schüller, of Berlin. The claim of beneficial results has since been upheld by him in several publications, mainly in a book published in 1891, and in an article in Eulenburg's "Encyclopædisches Jahrbuch," for 1892, a proof-sheet of which has been kindly sent me by the author. It is as just to him as it is convenient to me, while passing, to give you the results of my own experience with the drug, and to detail to you the main points insisted upon by him. From 1880 to 1891 he treated, through all these eleven years, ninety cases of tuberculous disease. Of these four are said to have died before 1891, seventy were cured, sixteen were still under treatment in 1891; part of them are said to have recovered since. As a rule, four doses were administered daily, from two to three drops each to children, from three to five to adults. These doses were mostly given either in sugar water or milk, or meat broth, or wine; not in pills. Nor does he administer them in capsules, because the undiluted guaiacol may irritate the mucous membrane. Injections into the subcutaneous tissue or the muscles he makes only in cases of necessity; for such the vehicle would be either glycerin or oil.¹ Schüller refers to Gregg, who gave guaiacol in

¹ Subcutaneous injections have also been recommended by L. Polyak (Pesth. Med. Press, No. 43, 1889, who eulogizes them, but who was forced to discontinue them through the refusal of the patients to submit to them because of their painfulness; Diamantberger (Gaz. Hôpit., No. 142, 1890), Schetelig, R. Robertson (Brit. Med. Jour., Nov. 14, 1891, p. 1040), and Picot, of Bordeaux (Sem. Médic., March 4, 1891), who employs one part of iodoform and five of guaiacol in one hundred parts of sterilized olive oil.

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enemata. It can be used in inhalations. A solution of one in from six hundred to a thousand may be employed for that purpose in catarrh of the pharynx, nose, and trachea, either for isolated cases or in larger rooms where "surgical" cases may congregate. Eighteen cases of pulmonary tuberculosis are said to have recovered. The remedy was given persistently, through many months or several years. It was supplemented according to indications, mainly in the beginning of the treatment, with expectorants, cardiac stimulants, and antipyretics; also for the purpose of inhalation, with turpentine or camphor. Seclusion in rooms or sojourn in institutions was not insisted upon; the remedy was employed in all conditions of life and occupations. Invariably, appetite and strength increased, expectoration became easier, cough became less, pus was gradually replaced by mucus, and the results of percussion and auscultation were more favorable. It took a long time, however, before any visible effect was obtained in regard to the number of bacilli present in the sputa. Many cases of surgical tuberculosis improved and recovered without an operation; still, as a general rule, local treatment and the use of guaiacol were both employed. The latter was administered, with good effect, in scrofulous eczema with bacilli, for caseous glands, and for tubercular bone. A case of caries of the petrous bone, complicated with meningeal symptoms, got well, after having been operated upon, under the use of guaiacol. No renal tuberculosis was experimented upon. Tuberculosis of the testicle is not recommended as a safe subject for experimentation. For injection into the tissues, guaiacol was dissolved in water, or combined with a ten per cent. mixture of iodoform with glycerin. A bad lupus of the ear was first treated with the actual cautery, then the injection was made. The first result was œdematous swelling and pain; after that, recovery took place uninterruptedly. The same injections were made into the capsules of joints and tubercular bones, particularly of the hip; also into the recent wounds of resections and excisions, which would heal without drainage being resorted to.

R. Seifert and F. Hölscher (*Berliner Klin. Wochenschr.*,

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No. 51, 1891, and No. 3, 1892), recommend the internal administration of the guaiacol carbamate in place of guaiacol. In their publication they refer to Sahli, who objected to the internal use of creasote (*Corresp. f. Schweizer A.*, 1887, No. 20), because of its uncertain percentage of guaiacol, of its combination with derivatives of the poisonous pyrogallie acid, and of its local caustic effect. Indeed, Bourget published cases in which a circumscribed cauterization could be proven. That is why Sahli turned to guaiacol, which he prescribed either in capsules or in a slightly alcoholic watery solution. He admits, however, that even his purest guaiacol contains but ninety per cent. of the genuine substance.

Seifert and Hölscher assume, without, however, having demonstrated it to be a fact, that guaiacol carries with it a similar local danger. Their carbonate is claimed to be chemically pure, solid, and crystalline, with its melting heat at from 86° to 90° C. It is odorless, tasteless, and does not irritate the mucous membrane. It is decomposed into guaiacol and carbonic acid in the intestine of the healthy person, and in the stomach (containing the products of putrefaction and fermentation) of the consumptive. Guaiacol is then absorbed at once, and is discoverable in the urine in from one-half to one hour. The dose of the salt is from two to five decigrammes (grains iii to viii) twice a day to six grammes (3iiss) daily. It is claimed to improve the appetite, to even produce hunger, to aid nutrition and increase the weight of the patient, to gradually reduce the cough, fever, and nightsweats, rhonchi, and dullness, to facilitate expectoration, and to have diminished the size of cavities. Amongst us, Dr. Kinnicutt has eulogized the carbonate very highly (*Boston Medical Journal*, 1892, No. 21).

The proportion of guaiacol contained in the carbonate is seventy-eight per cent., which it is worth considering when a certain amount is expected to be taken. Otherwise, it appears to be a safe enough preparation, much more so than impure guaiacol, or even the "pure" guaiacol of former times. At the present time, Schüller claims a percentage of ninety-nine per cent. in Riedel's "guaiacol

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purissimum." On the other hand, the best creasote contains but sixty per cent. of guaiacol, and benzoyl-guaiacol or benzosol (F. Walzer in *Deutsche Med. Wochenschr.*, Nov. 5, 1891), which has been recommended in tablets with cocoa or sugar, or as a powder mixed with elæosacch. menth. piperit., but fifty per cent.

What is the action of guaiacol? In the circulating blood, in expiration, or in the urine, it is not found; in the latter it is found changed into ether-sulphuric acid. As it is readily absorbed, it floats in the shape of an unknown combination which has no direct effect on the bacilli of tuberculosis. Indeed, it takes a long continuance of the administration of guaiacol before the number of bacilli are in the least affected. It is, therefore, rational to conclude that the drug alters the condition of the tissue in such a way as to prevent the bacilli from forming ptomaines. Seifert and Hölscher refer to the unstable and easily decomposed albuminoids of the blood as generating both fever and sweats. Through the sulphur contained in the albumin, these unstable albuminoids are thought to combine with the guaiacol upon its entrance into the circulation, so as to form ether-sulphuric salts. They also suggest that this is probably the mode of action and combination of all such substances as are eliminated as ether-sulphates; for instance, all phenols, and many "amines," such as phenacetin and acetanilide.

The remedy was almost exclusively given in four doses daily, after meals and at bedtime, in sweetened water or in milk, rarely in a mild wine or in a mixture of whiskey and water. In capsules, I have not given it except in a few cases. In this form it might produce local irritation if taken on an empty stomach. Subcutaneous injections I never made, nor do I intend to do so; for the treatment, if it be expected to be efficient, must be long continued. Nor can I expect that the rectum can be made stand the local irritation of the remedy for a sufficiently long time. Adults took four drops each time, children from one to three. More than twelve a day a child never received from me, nor an adult more than twenty-eight; larger doses have been given by others. I have not been obliged to entirely

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discontinue it; two patients did so, and quitted treatment altogether. In one I stopped it, the patient complaining of its bad taste, and his feeling more inconvenience than he thought he was willing to endure. Two cases discontinued temporarily because of a slight diarrhœa, which may have been due to other causes. Thus, Schüller observed loose bowels in a child who took guaiacol in pills made up with extr. glycyrrhizæ; this may have been the cause of the diarrhœa.

Inhalations have been added to the internal administration in ten cases. The easiest method of arranging for them suggests itself readily in an individual case. Soaking a sponge with guaiacol, exposing guaiacol in a plate, mixing it with water and gently heating it, thus filling the patient's room with the vapor, will be found satisfactory.

I did not commence the guaiacol treatment before September. Since that time more than one hundred cases have been subjected to it, mostly those of adults, and a few children of from four to thirteen years. They were either office or hospital cases. The time has been too short to speak of anything like definite results, if there be such a thing in a process as variable, capricious, and of as long duration as tuberculosis. Statistics must be very extensive to be anything like conclusive, and nothing is more deceptive than the enthusiasm engendered by the combination of an ingenious theory and our anxiety to aid the suffering. Besides, partial or total recoveries from pulmonary tuberculosis have occurred before our time, either in or out of special institutions. I emphasize special institutions because what I have seen of the effects of treatment in general hospitals was not encouraging. Indeed, I have seen a good many consumptives improved, and practically well, before I ever knew guaiacol. For what I said years ago, of the beneficial effect of arsenic and digitalis, I never had reason to regret or take back. While the results I had already seen follow the patient treatment of tuberculosis kept up my hopes, and while on the other hand the many failures added to anxiety and well-nigh despair, I was glad to welcome guaiacol, shortly after the great tuberculin discomfiture.

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A communication like the present, although it is based upon careful observation, can give you but impressions. I am as little given to boasting of cures as you are. But there are in the course of every case of tubercular consumption a number of symptoms which change with the general and local conditions to such an extent that by them we measure the anatomical lesions and calculate prognosis. Such symptoms are the general feeling and bearing of the patient, the state of his digestion, cough, expectoration (whether mucous, purulent, or bloody, the presence and number of bacilli in it), the extent and location of dulness and râles, and the amount of emaciation, if any. The importance of the latter is universally admitted, that of changes in regard to rhonchi and dulness, which has been doubted by Ewald and Guttman, will be upheld by most of us. For though it be true that not every expectoration need be characteristic, nor every dulness in or about a tubercular lung specific, still, the very engorgements and inflammatory, though in themselves not specific, infiltrations which come and now and then go, prove the constancy of the irritation which gives rise to them.

Let me make a broad statement at once. When the first patients who took guaiacol—a few in September, more in October and November—turned up again in December or about New Year's, after most of them had been exposed already to the winter crowding, closed windows, and winter weather, I was surprised at the almost uniformly favorable reports volunteered by almost all. There was hardly one but looked better and felt better; even a few absolutely hopeless cases with large cavities asserted they ate better, slept better, and sweated less. Most looked fairly well, and their strength had improved. In almost none had the emaciation increased, most had gained flesh, one ten pounds in two months. I will say right here that in every case where the diagnosis was not absolutely clear without it, the examination for bacilli was made and their presence proven positively. In many, digestion and appetite had improved at once. Cough became looser, and after a month or two appeared to be more mucous and less purulent.

I have not felt justified, in a large number of cases, to

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limit my therapeutical endeavors to the administration of guaiacol alone. The employment of arsenic (mainly arsenious acid) and digitalis in some form or another has rendered me such eminent service in the treatment of tuberculosis, that in at least half of the cases I have combined them with the use of guaiacol. The best method of giving them is in the shape of pills; almost everybody takes readily two milligrammes of arsenious acid (gr. $\frac{1}{30}$) and two or three milligrammes of (Merck's) digitaline three times a day. This mode of administration has, besides its tastelessness and its long toleration when taken after meals, the further advantage of the facility with which strychnine or another preparation of nux vomica, perhaps, also a mild laxative or a constipating drug, are combined with it. For indeed the disturbances of a universal tubercular process are many and various. They are in most cases anatomically tangible. Even if they were not so, I am not ashamed of owning up to my weakness of trying to make my patients comfortable, though a prescription may consist of more than one or two items. I still believe in my old saying that I prefer a prescription that acts well to one that looks well.

During cold weather cod-liver oil was recommended to all patients with fair digestion. Those with good cutaneous circulation would wash and rub with cold water, or water with alcohol, or warm water with alcohol, over all parts of their bodies. The complications with nasal and naso-pharyngeal catarrh were treated with salt water, sprays of nitrate of silver (1:20-1000), also with irrigations of acetico-tartrate of aluminium in water (1:75-120). Night-sweats have been treated with a single dose, given at bedtime, of a milligramme (gr. $\frac{1}{60}$) or less of atropine sulphate, or agaricine from six to twelve milligrammes. They may be combined, and frequently, when nocturnal cough proved too great a torture, one or both were combined with a dose of morphine.

PROLONGED MEDICATION, WITH SPECIAL REFERENCE TO DIGITALIS

SEVERAL meetings of the German Congress of Internal Medicine have discussed the effects of digitalis when given continuously for a long time. That question was also raised in a recent discussion, mainly by Dr. Robert Ingram and Dr. Frank Scherer, before the Academy of Medicine of Cincinnati.

The woful stories of its cumulative action were told and retold. Indeed, I dare say that there is no careful or careless practitioner that has not observed it; there may be nausea, vomiting, retarded or irregular pulse, and collapse. When I was young I saw it often, mainly after large and repeated doses, and remember well that I believed that I obtained a salutary effect—in pneumonia, for instance—from that very action. But after all time has taught me several things. I now know, for instance, and have acted on that knowledge for more than a decade, that in many bad cases of dilatation of the right heart, with cyanosis and orthopnea, when nothing but a large venesection appears to hold out a promise, one, two or three doses each of ten or twelve grains of digitalis, given at intervals of three or five hours, will contract the heart and restore pulmonary and general circulation; that, on the other hand, in chronic conditions of weak heart, of either muscular or nervous origin, or of insufficient action caused by pulmonary obstruction—as in chronic bronchopneumonia or in tuberculous infiltration—small doses of digitalis, that is, from 4 to 6 grains (0.3-0.4) daily, or its equivalent, may be given for weeks and months and even years without any hesitation. Such doses may be ordered while the patient is not expected to be seen for weeks or months. Indeed, there is hardly a day when I am not obliged to prescribe them to patients who I know will not reappear for a month or more. In most cases I pre-

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scribe either from four to six doses daily of Squibb's or any other good fluid extract, or the solid extract of the Pharmacopœia in the shape of pills, $1\frac{1}{2}$ grain (0.1) daily, usually $\frac{1}{2}$ grain three times a day, almost always in pills, rarely by itself, often in combination with sparteine, or strychnine, or arsenic or other drugs, as the case may require. Such combinations are generally observed to be useful, as nosologically they are required by the fact that the heart is not a uniform body, but a combination of muscular, vascular, and cerebro-spinal and sympathetic nerve fibers; that we have but rarely to deal with an affection of only one of them, and that the theoretical demand of only one remedy in a prescription looks well on the platform, as the ornamental trimming of an impressive address to the young, but gives one but a poor show at the bedside.

Patients who take digitalis in this way do not show a cumulative effect, nor are they getting accustomed to it to such an extent as to lose the benefit of its action. Indeed, their heart requires a daily stimulation and daily doses. Mercury is given for months, iodides for months, not only in syphilis but in the cardiac ailments of atheromatous old age where digitalis is not tolerated, and in asthmatic conditions. Arsenic is administered in psoriasis, lymphomatosis and sarcomatosis for months and years with rarely an interruption unless the doses be excessive. Phosphorus demands a course of six or eight weeks to break up a bad case of rhachitis. Thyroid, thymus, or suprarenal gland is required for many months or even years to accomplish the end in view. Everybody knows that and should add digitalis to the list of his drugs that ask for continued small doses when a continued effect is expected.

This looks so simple and *is* so simple that I never knew these thirty or forty years that I did anything which required discussion. During all this time I practised this method, taught it and mentioned it in papers, for instance, in one on "Arsenic and Digitalis in the Treatment of Consumption," read before the New York State Medical Society in 1884. Great, therefore, was my astonishment when before the Seventeenth Congress for Internal Medi-

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cine, two years ago (1899), Dr. Grödel of Nauheim spoke in favor of continued small doses of digitalis in appropriate cases. He was frowned down by most of the celebrities present, but soon Kussmaul¹ published his cases of continued digitalis treatment, and he is not usually frowned down. Thus it happened that this year public opinion veered rather in the direction of Grödel's position on that question, mostly with the understanding, however, that a careful watch must be had over the patient. When the observations of the past two years will have been confirmed by those of the next ten, that careful watch will be discontinued as unnecessary.

In my paper read before you in 1884, I discussed the effect of small doses of digitalis continued a long time and their action in pulmonary phthisis. I then spoke as follows: "In the vertebrate, digitalis increases the energy of the heart muscle and the volume of its contraction. Thereby it increases arterial pressure and diminishes the frequency of the pulse. In this connection it is of no consequence whether the irritation of the inhibitory nerve is the primary or the secondary element. By increasing pressure in the arteries, besides favoring the secretion of the kidneys, it improves the pulmonary circulation, empties the veins and thereby accelerates the circulation of the lymph and tissue fluids. Thus, while having an immediate effect upon the heart and lungs, it exerts a powerful influence on assimilation and elimination, that is, nutrition in general.

"Therefore, both the local and general effect of digitalis are invaluable in all stages of phthisis. While, however, they may relieve in the last, they are a healing element in the first stages; the congestive and nutritive changes constituting the preparatory and, in part, the advanced stages of consumption are favorably influenced. I seldom treat a case of pulmonary tuberculosis without it. Very little care is required to avoid disagreeable results. Cumulative effects are either the consequence of excessive or too frequent—unnecessarily frequent—doses, or of the selection of improper preparations. Such, however, as are

¹ Therapie der Gegenwart, 1900, No. 1.

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soluble in water with difficulty ought not to be used, for it may happen that, having been inert for some time, a large amount may enter the circulation at once. Particularly is this true of digitalin, which is by no means a soluble alkaloid, but a crystallizable glucoside of uncertain strength. The digitalins of different manufacturers yield widely differing results; the majority require immense doses compared with the dictates of the books in order to exhibit a perceptible effect. I use the infusion, the tincture, the fluid extract, and the solid extract. Their relative values I do not desire to discuss, except in regard to their advisability in phthisis, and the possibility of continuing them for a long time. Patients of that class we see from time to time only; they require advice and prescription for protracted periods. As a rule their digestive organs are amongst the first to suffer; indeed, many an alleged dyspeptic patient is afflicted with gastric disturbances first, and has his attention drawn to the lungs by his physician, who discovers the cause of his gastric catarrh in the retarded circulation of heart and lungs.

“In such a case the stomach exhibits the peripherous symptoms of the distant diseased organs in the same manner that a local disease of the brain or cord shows itself first in affections of peripherous nerves. Now, whenever the stomach is first affected neither the tincture nor the infusion is tolerated long. The latter, the officinal preparation, may be given three times daily in doses of half a tablespoonful each, or in two or three teaspoonfuls each, for some time; but I seldom wish to recommend it for more than four or five days in succession without seeing the patient. The fluid extract has often disappointed me; I cannot tell why, nor do I claim to know why. [That is what I said sixteen years ago; I can now say after daily observation extending over many years, I have learned to rely on Squibb's and some other fluid extracts.] My main reliance is on the solid extract and my almost universal method of giving it is in the form of a pill, in such combinations as will suit the individual case. The stomach does not object to it and taste is not offended by it. I often prescribe $1\frac{1}{2}$ to $1\frac{3}{4}$ grains, corresponding to three

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and a half times its weight of digitalis, for weeks without expecting to see the case again. It combines with extract of nux vomica, with iron, with arsenic, with extract of belladonna, or extract of physostigma (Calabar bean), with ext. coloc. compound—in fact, with anything. Such combinations are frequently required in the early stages of consumption. The general muscular system needs toning up, the intestinal muscle requires strengthening, the intestinal tract evacuation, the intestinal and abdominal circulation easing. At the same time, iron may be added when there is no fever; or caffeine for its stimulant effect upon the heart and arteries.”

Speaking as a general practitioner before a meeting composed almost exclusively of general practitioners, I desire to add in this connection a single remark on the general usefulness of digitalis in other cases. Every chronic disease and the results of the wear and tear of what is called civilized life have a depressing influence on all parts of the organism. The heart is not the last to suffer. Its muscular strength is tasked every second; it is the very organ that cannot and must not rest. Stagnation in an outlying province will overexert it; ill nutrition of the nerves will influence it, general anemia exhaust it, infection paralyze it, weak circulation or venous obstruction interfere with its structure and strength.

Now, what alcohol and ether are to the nerves, strychnine to the muscles in general, digitalis is to the heart, except in a condition of acute myocarditis. The increase of arterial pressure which it produces is beneficial not only to the outlying provinces, but also to the circulation and nutrition of the heart muscle itself. Thus, in all cases of general anemia, in slow convalescence where iron and nux vomica are called for, digitalis is likewise required. It strengthens the heart, propels the blood stagnating in its own fibers, and shortens the period of recovery. I have learned to look upon digitalis for restoring vigor and strength as of more than mere symptomatic value; I consider it one of the best tonics, along with iron, nux and arsenic, when given in small doses persistently.

The main effect of digitalis is the increase of cardiac

contraction and of the volume of the pulse. Both are, according to Schmiedeberg, caused by the improved elasticity of the heart muscle and its more intense shortening during systole. The concomitant result is an improved action in diastole, for a heart that is thoroughly emptied during systole is better qualified to aspirate a new supply. The retardation of the heart-beat resulting from the stimulation of the pneumogastric nerve through the action of digitalis allows opportunity for the complete emptying of the ventricle with consecutive improved aspiration; in other words, the arterial blood-pressure and circulation are increased and afford the veins ample opportunity to discharge their contents. That is the effect of large doses of digitalis given once or oftener. To give big doses too often may lead to the exhibition of one or more of its bad effects, the so-called cumulation. Large doses, however, are not required for long, but many cardiac diseases demand moderate doses for moderate effect; more still require a persistent effect for the symptoms caused by anatomical lesions which cannot be removed. It is these that cause a persistent moderate incompetency of the action of the heart, which can be dealt with only by just as persistent moderate doses of the proper remedy. Years of cardiac ailment should be met by years of cardiac medication. This is intelligible to those who will be good enough to consider that insufficient metabolism and the hunger of the tissues can be treated only by persistent feeding, say three or four times daily, and not by the pouring in of a dozen beefsteaks at a time with fasting afterward.

The small doses which I recommend as the regular daily measure have only a moderate action on the blood-vessels. That is important to know, because large doses may contract the small arteries to such an extent as to increase the labor the heart has to undergo to overcome the increased peripheral resistance.

The indications for the use of digitalis according to the methods just indicated are the insufficiency of the heart muscle and the incompetency of the mitral valve. Chronic myocarditis is no contraindication. Large doses may over-exert the inflamed muscle; that is why digitalis in large

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doses is very badly borne in *acute* myocarditis; small ones are often serviceable when the first onset is passed. Aortic insufficiency has been declared a contraindication to digitalis by some, an indication by others. I feel certain that these observers had different cases to deal with. Aortic insufficiency, when incipient or moderate, is easily compensated, gives no uneasiness to the patient, is not complained of, and is seldom observed when recent. This is the time when such doses of digitalis continued a long time prove of permanent service. Only those, however, can be thus benefited whose cases are recognized early, either accidentally or through careful self-observation by the patient. When, however, the case is old and compensation greatly disturbed, with considerable peripheral venous obstruction, even digitalis will not suffice to restore the equilibrium between the action of the heart and the capillary circulation of distant organs.

A last word on one form of incompetent metabolism with which we frequently have dealings, namely, chlorosis. I never treat it without adding digitalis to the iron and the mild vegetable purgative the patient is to take. Its influence on the circulation of the body in general and the heart vessels in particular is such as to improve general and local nutrition for reasons detailed before. All forms of chlorosis are benefited by it, the common as well as the severe form pictured by Virchow and Germain Sée. In this, while the heart may be normal in size but is generally of feeble structure, the arteries are small and do not provide for a sufficient organic nutrition. It will be easily perceived how the action of digitalis in small doses, persistently given, cannot help but be beneficial.

THE TONSIL AS A PORTAL OF MICROBIC AND TOXIC INVASION

You have been good enough to re-elect me to the position I occupied during the early part of the existence of this Society. The honor, for which I thank you from the innermost of my heart, was surely unexpected; for a re-election under these circumstances is unusual. Now, however, that I have been the recipient a second time of this great distinction, let me suggest to you the possibility of abolishing the old custom of never according a re-election to a former incumbent. There may be reasons for not changing it, but I can imagine that the Society may not forever bind itself to persist in annual changes. The desire to become the presiding officer of this distinguished body is justifiable and natural, but it may be in its occasional interest to reappoint a former officer.

My present remarks should not be considered in the light of a formal address. Nothing I could present to you satisfies my wish to serve you; but the exigencies of the past weeks have prevented me from coming before you with an essay worthy of the occasion. Still, it occurred to me that you would be satisfied with the consideration of a problem which appears to become less soluble the more copious its literature has grown. What I allude to is the rôle the tonsil plays in the absorption of bacteria or toxins. Clinical observations on that subject are very numerous, and deserve the same credit due to every accurately observed fact; but will rarely be numerous enough to decide the exclusive or partial port of entry of a poison into the circulation. For we are seldom in a position to separate the tonsil from its neighborhood during the acute invasion or the rapid progress of a microbic or toxic poison. Altogether, I mean to approach the subject as

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well from an anatomical point of view as from that of clinical experience.

At the head of what I have to say I place observations I have made many hundreds of times, formulated in papers and books repeatedly these forty and more years, and which have been confirmed by the observations of others. Cases of membranous throat diseases behave differently according to their location. What we called diphtheria in 1858 and twenty-five years afterwards and at present either diphtheria, or pseudodiphtheria, or coccus invasion, or what not, behaves alike in its relation to the lymph system and especially to the lymph bodies of the neighborhood. The observations are easy, because in these affections there is a visible result of the invasions in the shape of membranous tufts or layers, and the invasion itself can be traced to an almost always definite day followed by a brief incubation, contrary to what we know of the invasion of tuberculosis. Now, whenever the membrane is limited to the tonsil there is very little or no glandular swelling in the neighborhood. On the other hand, if a membrane extends from the tonsil to its neighborhood, or starts at a distance from the tonsil, neighboring lymph bodies swell at once. Again, the treatment of this neighborhood shows its effect almost immediately on the swelled glands. That is mostly evident when the seat of the membrane is anywhere in the posterior nares which excel by an immense network of lymphatics. On the other hand, when it covers the vocal cords and Morgagni's fossa, both of which have only a scanty network of lymphatics, there is no adenitis nor any constitutional symptoms. Indeed, it has been well known these thirty years that an uncomplicated case of laryngeal diphtheria, so-called pseudomembranous croup, is not attended with either glandular swelling or fever. These clinical observations have stood the test of time and must be reckoned with. If there were no rational explanation at present we should have to wait for it, for it would not be the first time for the explanation to lag behind the observation and frequent confirmation of a fact.

For an explanation we shall have to look, if anywhere,

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to the anatomy of the parts. If a laryngeal pseudomembrane causes no glandular swelling and no fever, and we recognize the cause of this fact in the scantiness of the lymphatic network, we turn to the tonsil with the attempt at ascertaining whether the isolation of the morbid product on the surface or in the interior of the tonsil depends on a similar anatomical condition.

From my treatise of diphtheria published in 1880 I beg to quote the following lines:

“The tonsils are conglomerations of an indefinite number of glandular bodies, each of which has a thick capsule which is of irregular shape, and consists of connective tissue lined by mucous membrane and pavement epithelium. The connective tissue contains a number of closed follicles, each inclosing numerous lymph-corpuscles. These follicles have been considered identical with, or analogous to, the lymphatic glands; this assumption is purely problematical, since it has not been possible, thus far, to verify the existence of afferent or efferent ducts of their own. The practical deduction from this is, that the tonsils have little or no connection with the lymphatic system. The number of blood-vessels in the normal tonsil is not large, and it becomes greatly diminished when that organ has been the seat of repeated chronic inflammations. It is in these very cases of chronic inflammation and enlargement of the tonsils, with considerable hypertrophy of the connective tissue, that, for instance, diphtheritic attacks are most frequently observed, especially, of course, when a fresh irritation has given rise to inflammation and an edematous enlargement.”

This statement of our knowledge of 1880 requires, as you will see, in the light of later anatomical research, some modification; one of the tonsil's functions is surely that of either preparing or storing leucocytes. In the embryonic life the thymus is the first to perform that function. Does its rôle pass to the tonsil in the born child? We should hesitate to accept that without caution, for the thymus continues to grow absolutely for several years after birth. Or are both thymus and tonsil replaced

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by solitary follicles and the adenoid tissue of the appendix in later life? Here again is the reason to pause. For the appendix grows smaller with increasing years, relatively, aye, even absolutely. The tonsil is a type of conglomerated follicular glands, ten to twenty, according to Koelliker, eight to fifteen, according to Hodenpyl. It is perforated by crypts which unite in two or three long and deep pockets or form in rare cases a deep fissure (similar to what, according to Schmidt, is often found in certain animals).

The external adherent deep surface is covered by a fibrous capsule and outside it by the amygdalo-glossal, upper constrictor, and stylopharyngeal muscles. This fibrous capsule is of various thickness; sometimes so disposed, according to Hodenpyl, as to send along the tonsillar blood-vessels a network of fibrous tissue which prevents them from ready contraction after having been cut. That occurrence furnishes the explanation of the occasional hemorrhages, after resections, from the tonsillar stump, though the anterior palatine artery be not touched at all. But thick or thin, coming from the fibrous membrane of the pharynx, the fibrous capsule is firm and solid.¹ That is

¹ Our text books are not particularly accurate. F. H. Gerrish (a text book of anatomy by American authors, 1902, p. 730) has only this to say, that the tonsil's "external surface is attached to the upper constrictor by areolar tissue." The text book of anatomy, by D. J. Cunningham, New York, 1905, p. 1,036, expresses itself as follows: "The outer or attached surface of the tonsil is enclosed in a distinct fibrous capsule connected with the pharyngeal aponeurosis, outside which lie the superior constrictor of the pharynx and the internal pterygoid muscles." Gray's anatomy of 1897, p. 935—older than most references quoted by me—when speaking of the lymph circulation of the tonsils, says: "Surrounding each follicle is a close plexus of lymphatic vessels. From these plexuses the lymphatic vessels pass to the deep cervical glands in the upper part of the neck, which frequently become enlarged in affections of these organs." Cunningham says only: "The lymphatics are extremely numerous and pass down to join some of the submaxillary lymphatic glands near the angle of the jaw." Retterer, Hodenpyl, Labbé and Poirier are not quoted.

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why abscesses of the tonsil do not open into the maxillo-pharyngeal space. From it, like Hodenpyl's periarterial processes, it sends off connective tissue into and between the folds of the mucosa.

It should be added that it also contains in its tissue thick lymphatic trunks, blood-vessels and, according to Koelliker, contracting muscular fibres emanating from the superior constrictor.

Whether these lymphatic trunks can ever be active depends on the condition of the lymph circulation within the tonsil itself.

It is reasonable to conclude that as long as a tonsil is normal, not inflamed, either acutely or chronically, it will behave more or less like a normal tonsil treated on the laboratory table. That is, almost like injection material, living invading material may enter the lymph circulation, or the blood circulation, provided there is a break in a wall, but not with the same facility as injection material forced in. A surface lesion must always be supposed to exist when a living germ or a toxin is to find access. If that were not so, no human or inferior animal could exist under the clouds of microbes and toxins surrounding us. There is only one exception. Stoehr has shown small gaps between the normal epithelia of the surface of the tonsil. It looks rational, therefore, to admit that when there is merely a surface lesion, though ever so slight, there may be an invasion into the tonsil. When, however, the vessels are exposed to pressure by newly formed cells or tissue, there is no invasion, certainly not beyond the tonsil itself, no ganglionic swelling, no toxic poisoning.

It is even rational to believe that now and then, when tonsils, or, what is more common, a single follicle, becomes inflamed, the very venous obstruction will exert the bactericidal influence of the stagnating blood serum.

The lymph vessels of the pharynx come from two sources, from the mucous membrane and from the muscles. The muscular network is of little importance. Even Sappey did not inject it except in cattle and the horse. The mucous network is immediately under the epithelium of the surface; and is mostly developed in the pharyngo-

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laryngeal grooves and on the posterior wall of the larynx.²

On the level of the palatine tonsil—that is, not on the tonsil itself—the mucous network of the lymph current presents an unusual richness and its walls are very thin. Near the esophagus there are few lymph vessels.

Collecting trunks there are three: First, upper; second, middle; third, lower. The first and third do not concern us to-day. The second comes not so much from the tonsils as from the mucous membrane of the adjacent parts. They perforate the muscular tunic just above the big horn of the hyoid bone. Its ganglia are just below the posterior belly of the digastric muscle.

The second volume, p. 1297, of Poirier and Charpy's Anatomy, treating of the tonsil, says nothing of the lymph vessels and its efferent trunks of the tonsils, but the fourth volume does. I refer to p. 92. The lymph vessels of the tonsils originate, first, in the cul-de-sac descending from the surface of the crypts; second, from the ringform nets situated around the follicles; third, from the inter-follicular tissue. They all form a network which finally, according to Poirier, but not to many others, passes into the fibrous capsule, where they swell into long trunks containing valves and ganglionic enlargements and at last, together with the lymph ducts of the base of the tongue, end in the submaxillary ganglia near the angle of the jaw and near the hyoid bone. *There are, however* (Labbé), *no lymphatic sinuses around the tonsil*, such as you see around ganglia in other parts of the body.

Now comes a very important statement: Retterer (1886) concluded from his injections of gelatin and silver nitrate, that the lymph net occupies the whole follicular mass of the tonsils, and constitutes in these organs a system of closed canals which *do not open into* the connective reticulum either by open stomata or by extensive outrunners. This is confirmed by Hodenpyl, though denied by other observers.

² I mean to add here, not on the vocal cords; that explains, as I have done these more than thirty years, the absence of constitutional symptoms in purely laryngeal diphtheria; that is, uncomplicated "membranous croup."

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A. Most (*Arch. f. Anat. u. Entw. gesch.*, 1901, p. 86), one of the latest investigators, had the following experience: While injecting the lymph vessels of the lateral pharyngeal wall, the effect was governed by the exact location. "When an injection was made near the pharyngeal tube orifice, it would run in both directions, both backwards and forwards; when in the region of the tonsil, the injected material would run off to the anterior parts of the fauces only." This suggests limited or absent absorption posteriorly. Thus, even near the tonsil, not to speak of the tonsil itself, there is less lymph circulation than posteriorly. "The lymph vessels of the tonsils and of the neighboring mucous membranes, and of the anterior and posterior palatine arches, gather in three or five efferent trunks. They finally arrive at glands which lie laterally of the jugular vein and near or below the lateral belly of the digastric muscle. One lymph body is located in the angle formed by the anterior facial and the internal jugular." Thus, under very favorable circumstances, there must be a possibility of the contents of the lymph circulation getting away from the tonsil.

One of the very latest writers, perhaps the latest, is George Bacon Wood. He published an essay on the lymphatic drainage of the faucial tonsils in the *American Journal of the Medical Sciences*, August, 1905. Wishing to do justice to my subject, I quote from him largely, for it must be supposed that before writing a monographic essay he made himself perfectly acquainted with the literature of the subject. "It has been proven," he says, "by several very thorough and capable investigators that foreign bodies in the crypts can pass through the epithelium into the inter-follicular tissue. This inter-follicular tissue consists of fine connective tissue reticulum interspersed with numerous lymphoid cells. These pass into the lymph spaces which terminate in the trabeculae of the tonsil and which in their turn empty into the efferent lymphatics of the tonsil." Thus the author thinks a current is established into which the said foreign bodies are introduced. He also reports that he forced injection material by gentle massage (p. 220) into the efferent lymph ducts and a few of

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the lymph bodies of the neck, and suggests that bacteria may get into the body by their own locomotion or by their growth. And he adds verbally: "I have not been able to find any reliable published data concerning the glands that receive the efferent lymphatics of the tonsils." And on p. 127 he has what follows: "I understand thoroughly that in advancing this idea, I am open to criticism for theorizing about a scientific subject. It seems to me, however, that the above is a probable explanation of the mechanism of tonsillar absorption and helps to substantiate the theory that the faucial tonsil is more important as a source of infection than is the lymphoid tissue on the lateral folds and posterior wall of the pharynx."

In all of this I think he is open to exactly the criticism he means to disarm. What he should set out to demonstrate he has not demonstrated.

One of the glands, under the sternocleidomastoid where it is crossed by the digastric muscle, he claims as tonsillar. His injections were not equally successful. It receives lymph from the lymph bodies of the throat also. Finally, our author says (p. 224): "The most important infections of the cervical lymphatics originate through the tonsil, and because of the importance of the tonsil in the origin of the infections, I feel that the term tonsillar is a most appropriate one." He takes things too easy. What he sets out to prove he simply postulates. He takes the theory of tonsillar invasion for granted, wisely concludes there must be a sufficient number and calibre of afferent and efferent vessels, and courageously postulates as an anatomical fact what he proposes as a theory.

A number of facts should be considered in connection with the structure and the absorbing and transmitting power of the tonsil. Its surface epithelium is, according to Stoehr, not uniform, and may admit foreign material even without lesion. Thus an invasion into the normal tonsil is possible.

A catarrh, with destruction of epithelium, may add to that possibility.

The lymph current near the tonsil is less active than

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that of the pharynx at some distance. There are, moreover (Labbé), no lymphatic sinuses round the tonsil.

There is a system of closed canals *in the follicles* which *do not open* into the connective reticulum. This observation of Retterer is confirmed by Hodenpyl.

The external deep surface of the tonsil is covered by a firm fibrous capsule. Still, according to many, there is a lymph communication between the tonsil and at least one gland situated near and below the crossing of the sternocleidomastoid and digastric muscles.

Exposure, and many diseases, change the surface and the structure of the tonsil.

Every new inflammation changes them. New cell infiltration and cicatricial tissue renders absorption less possible. Blood and lymph vessels are compressed and undergo atrophy. That is why in advanced life the tonsil gets harder and smaller, and infections become less. No tonsil remains long in its original condition; and the same deleterious influences will no longer prove effective.

Laboratory injections into the normal tonsillar structure are made under pressure, and prove nothing, or very little, for the unembarrassed organ when *in situ*, and surely not under pathological conditions. Thus, while the normal infantile tonsil which has not suffered from previous exposure or disease may or must be believed to permit *some* invasion into the tonsillar structure, and sometimes even beyond it, microbic invasion through the tonsil is not predominant over that which takes place through the lymph apparatus of the pharynx.

That agrees perfectly with the clinical observation of local toxic affections of the oral cavity, according to which membranous affections limited to the tonsil cause no, or little, adenitis or constitutional symptoms.

TONSILS, OR GENERAL LYMPH APPARATUS OF THE PHARYNX—WHICH?

THE oral surface of a tonsil is irregular and shows a number of orifices which lead into the interior of the crypts (follicles, lacunæ). These orifices expand interiorly and many of them connect. They are covered with a mucous membrane supplied with pavement epithelium resembling that of the pharynx. Into the crypts numerous mucous glands covered with cylindrical epithelium (Stöhr) excrete their mucus which is propelled into the pharyngeal cavity and carries with it much deleterious material which had entered the tonsil. This protective influence is still enhanced by the rapid emigration of leucocytes, which exert their germicidal function by phagocytosis (Packard, *Philadelphia Medical Journal*, April 28, 1900) or by the presence of alexins (Buchner).

The real tonsillar tissue consists of numerous acinous glands with a copious lymphatic (cytogene or adenoid) tissue, imbedded in a stroma of cellular tissue. This stroma comes from the surrounding capsule and from the connective tissue of the mucous membrane. The surrounding fibrous capsule has, according to Zuckerkandl ("Normal and Pathological Anatomy of the Nasal Cavity and its Appendages," Vienna, 1893), a thickness of a millimeter. Other anatomical facts quoted by Dr. Jacobi in the July number of *Archives of Pediatrics*, especially the results of studies by Labbé, Retterer, Hodenpyl and Most, justify the conclusion that there are nets of lymph vessels inside the tonsil which do not open even into its connective tissue reticulum, and that injections made *into the region* of the tonsil (not even into the tonsil itself) would not spread like those made into other parts of the nasopharynx. It would appear, therefore, that the tonsil and its immediate neighborhood are rather inferior, in regard to facilities

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for absorption, to the rest of the pharynx and the nares, with their lymphatic pharyngeal ring.¹

Thirty years ago, in *The American Journal of Obstetrics and Diseases of Women and Children*, and again twenty-six years ago, in his "Treatise on Diphtheria," Jacobi made the statement that glandular swellings in the neck were rare or comparatively slight in all cases of membranous throat disease confined to the tonsil; and that extensive glandular swelling and constitutional symptoms, often increasing to fatal sepsis, would appear when the local membranous affection of the tonsil extended to the rest of the pharynx, or when it began in the pharynx or posterior nares. Diphtheria of the posterior nares was recognized as one of the most formidable forms; indeed, sepsis and death were the rule, and Roger declared it to be hopeless. This opinion prevailed until Jacobi insisted upon early and regular irrigations of, or injections into, the nares, using either disinfectant or merely cleansing solutions. All this is known, even to some European writers (Monti, Baginsky and others), not, however, to August Most, who, in his latest book ("The Topography of the Lymph Vessel Apparatus of the Head and the Throat in Their Significance for Surgery," Breslau, 1906), remarks that the clinical

¹ What Waldeyer called "the lymphatic pharyngeal ring" is composed as follows: It begins with the two pharyngeal tonsils, continues in the lingual tonsils of lymph bodies located in the base of the tongue, and ascends, near the orifices of the Eustachian tubes. It is connected, and is structurally identical, with the lymph apparatuses surrounding the posterior nares and that of the velum palati and uvula, all of which originate and develop, according to Hammar, equably and contemporaneously during embryonic life (*Archiv für. Mikroskop. Anat.*, 1902, Vol. LXI.). Most fully accepts these anatomical data and has succeeded in overcoming the technical difficulties connected with the injection of the lymph apparatus of these minute parts. Very properly Grober on page 10 of his book quotes him in connection with "the lymph of the tonsils and the palatine arches," but very improperly on page 11 in connection with "the lymph current from the tonsils" only.

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importance of the lymph vessels of the nasal mucous membrane has "perhaps" not met with the appreciation that may be due to it. The same author quotes Heidenhayn, who states that "the prognosis of operations on pharyngeal carcinoma is extremely bad, that relapses are speedy, and that Czerny had no permanent cure in 47 cases." On the other hand, we have reason to believe that malignant tumors limited to the tonsil are not so inaccessible to operative success. After all, the emphasis laid on the excessive rôle of the tonsils as an absorbent agent, and a portal of invasion, is slightly injudicious.

The cause of the relative innocence of membranous processes when limited to the tonsils was explained by Jacobi by the thick fibrous capsule surrounding the tonsil; while there was no such obstacle to immediate absorption of the diphtheritic "virus" (we had no bacilli at that time), and to sepsis when the process took place about and near the rest of the lymph apparatus of the naso-pharynx.

Since those early times much has been written on the same subject. "Angina" has been charged with causing, or rather occasioning, rheumatism, scarlatina, morbilli, tuberculosis, and other infectious diseases. It appears, however, that a grave mistake has been made by paying attention to the tonsil to the exclusion of the rest, or rather the more important part, of the nasopharyngeal lymph apparatus. That is so true that even such authors as are well aware of the dignity of the latter speak of the tonsil and of the nasopharyngeal lymph apparatus as if they were identical, or synonymous. We find only few to be immune from this fault. One of them is Westenhöfer, who (*Berl. Klin. Woch.*, 1905, No. 24) found the portal of invasion for the microbic cause of cerebro-spinal meningitis to be in the lymphatic apparatus of the posterior nares and the pharynx. Naturally, he also mentions the tonsil, but does not commit the mistake of making it alone responsible for the etiological culpability of the whole nasopharynx.

On the other hand, I. Grober has written a book ("The Tonsils as Portals of Invasion for Causes of Disease,

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mainly for the Tubercle Bacilli," Jena, 1905) to substantiate his opinion that tuberculosis is transmitted to the apices of the lungs from the tonsils through direct lymph connections. In speaking of prophylaxis, he says: "The most radical means would be to remove the tonsil from every person. This is a proposition seriously made by Frenchmen." He forgets that Baumann, a German, has made the same proposition, adding, however, that there are but few persons, except himself, capable of removing the whole tonsil. Grober adds: "It is not possible, however, to remove the tonsil entire; besides, after its removal, there would be left behind, in the other parts of the lymphatic pharyngeal ring, apparatuses of equal anatomical and functional value which would assume the rôle of the tonsil."

Moreover, the comparative absence of a direct communication of the tonsil with the rest of the body through the surrounding fibrous capsule is demonstrated by Grober on page 38. In his injections of the tonsil copious amounts of his injection material filled the lymph spaces of the tonsils. It would accumulate in large quantities under the membrana propria (capsule) which, consisting of connective tissue, allows lymph vessels "to pass in few places only." Thus it happened that the organs were often enlarged to a considerable extent. The adipose tissue surrounding the tonsil seems to be rather devoid of lymph vessels; it exhibited but a small quantity of the injected material. There was, however, a considerable amount of it in the connective interstices of the pharyngeal muscles located in the neighborhood of the tonsils; so much, indeed, that the muscles were forced asunder.

These facts and considerations connected with "the Tonsil as a Portal of Microbic and Toxic Invasion," which formed the topic of Dr. Jacobi's inaugural address delivered before the American Pediatric Society, we beg to submit to our readers in addition to his paper which we published in our July number. His conclusions (p. 488) seem justified. There is a certain amount of absorption in and from the tonsil, but it is inferior to that going on in the rest of the copious lymph nets of the pharynx and posterior nares.

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Its quantity depends on the condition of the tonsil (normal, catarrhal, inflamed, cicatrized, infantile, adult). At all events, the tonsil should not be credited with the function performed by the numerous and unhampered lymph apparatuses of the nasopharynx. It is as easy to speak of the latter as of the former, and it is more accurate.



FOLLICULAR AMYGDALITIS

IN Nos. 17 and 18, 1886, of the *Berlin Clinical Weekly*, Professor B. Fraenkel published a paper, read before the Berlin Medical Society, on "Angina Lacunaris and Diphtheritica." In that essay he quoted several times a short paper of mine, which appeared in the *New York Medical Journal*, of September 24, 1884, under the heading, "Diphtheria Spread by Adults." Professor Fraenkel expresses himself as follows: "A. Jacobi asserts that diphtheria is spread by adults suffering from angina lacunaris. As this affection is a very frequent one, and as the patients suffering from it do not stay at home, Jacobi assumes that this affection, while not dangerous to the patients themselves, becomes an urgent danger to the community." Professor Fraenkel then adds: "I do not go so far." Still, he does go so far, for he reports the case of a girl aged twelve, who, while herself suffering from "angina lacunaris," infected her whole family with diphtheria. He then says: "Such cases, however, are so rare that I cannot agree with Jacobi in this, that the spreading of diphtheria is attributable to angina lacunaris. Still, there is a possibility that diphtheria may be spread through angina lacunaris, and, therefore, I deem it proper, as a measure of caution, to isolate cases of angina lacunaris."

These quotations have induced me to refer again to the subject of angina lacunaris, amygdalitis follicularis, "tonsillitis follicularis," and to propose the subject for your consideration. My reason for so doing is not the fact that my opinions and statements have been quoted rather incompletely or erroneously, but because it still appears necessary to fix the relation of follicular inflammation of the tonsils to tonsillar and general diphtheria beyond a doubt. I have tried to do so repeatedly, but have not been satisfied with the effect of my previous

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statements and deductions. What I desire to emphasize at once, however, is that I do not—as I am quoted—assert that diphtheria is spread by adults suffering from follicular amygdalitis. On the contrary, what I did say and do say is this, that what, in an individual case was called by that name and then gave rise to diphtheria, was diphtheria, and, therefore, produced diphtheria. Nor do I say that every case of follicular affection of the tonsils is diphtheria, and that diphtheria in general is spread by follicular amygdalitis in general, but I claim that the name of follicular or lacunar amygdalitis is but a subterfuge for the lack of a correct or complete diagnosis. There are cases of follicular amygdalitis of a catarrhal, purulent, fibrinous, and diphtheritic character, and its name ought to be dropped from our nomenclature, because of its giving rise to mistakes unless it be complemented with a descriptive adjective.

Professor Fraenkel makes the statement that he has changed his opinion on the relations between follicular amygdalitis and diphtheria since the year 1881. In that year (*Berlin. klin. W.*, No. 47) he published a paper in which he denied the possibility of the former ever being an infectious disease. His denial was based on the fact that an attack of follicular amygdalitis did not protect the patient, but, on the contrary, created a predisposition to relapses. He forgot that a first attack of acute rheumatism, or of erysipelas creates rather than annihilates a predisposition to relapses, and still both are counted among the infectious maladies. He says he forgot that circumstance. But he has forgotten more. He forgets that I have claimed, and do claim, that a previous attack of diphtheria predisposes to future attacks of the same kind, and, what is more important, that this observation and statement have been found to be correct by many other authors since. In regard to his changed views he refers to Friedreich as the first to count certain cases of lacunar amygdalitis among the infectious diseases. This great author bases his position on the following observations:¹ Before there are any local symptoms there is *sometimes*

¹ Volkman's series of clinical lectures, No. 75.

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a chill. The fever is *often* found to be higher than the local affection appears to justify. Further, the fever is *apt* to exhibit a cyclical curve. *Sometimes* Friedreich noticed a swelling of the spleen, and prostration and debility were *often* too marked for a merely local process.

I have known very long that certain diseases of the throat occurring during the prevalence of an epidemic of diphtheria—though they were not claimed as genuine diphtheria—belong to or are intimately related with this malady, and are, or can be, of an infectious character. Allow me to prove this assertion by quoting a few lines from my first papers on diphtheria which appeared in the *American Medical Times* of August 11 and 18, 1860, under the title, "On Diphtheria and Diphtheritic Affections." There I say: "The register of the (German) dispensary shows, for January, 1860, the number of eighteen cases of membranous diphtheritis, and in nine cases of effections considered by us to belong to the verge of, and caused by, the epidemic. While the records of our private patients, during the first week of January, gives out of the whole number of seventy-seven, sixteen cases of membraneous diphtheria, and thirteen of the second class. This distinction has always been kept up by us. The diagnosis of diphtheria was never considered to be unimpeachable except in such cases as offered well-developed membrane. Among the second class of such diseases as were considered by us to be influenced or brought on by the epidemic genius, we have counted and put down stomatitis, pharyngitis, diphtheritic pharyngitis, cervical adenitis, and diphtheritic fever. Of the 2,577 patients of the children's class, during the last nineteen months, there were 200 cases of diphtheria and 185 of kindred diseases."

Permit me to make one more quotation from the same paper: "There is a form of the diphtheritic process in which very little or no fever is perceived, and little or no glandular swelling will take place. The congestion and swelling of the pharynx are not very marked, and the first remarkable appearance is noticed on the follicles of the mucous membrane of the pharynx. They are visi-

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ble as whitish-gray spots of a twentieth or a twelfth of an inch in diameter. Not long after, however, membranes are formed, and the whole process will run its course in sometimes three or four days, without any great inconvenience to the patient. But there are cases in which the symptoms will increase in severity, fever will set in, and sub-maxillary and cervical adenitis take place. Such cases have been set apart by some authors as 'mild membranous angina,' 'herpes of the throat,' or 'herpetic angina.' We do not see anything else in these cases but mild diphtheria, mostly without pronounced general symptoms. We have not found any more reason to distinguish this form, of which, however, we have not seen more than a dozen cases, from diphtheria, than we should think of excluding a case of scarlet fever, without fever and with less than the usual eruption, from the record of cases of scarlatina. Moreover, we have pointed to the fact that such apparently simple cases will sometimes be followed by fever and adenitis; and when we add, further, that some of these mild cases of 'herpetic angina' have been followed by diphtheritic paralysis, we ought to lay aside our fondness for classification and subdivision. The clinical conditions of the diphtheritic process are variable in their appearance but alike in their innermost nature." These, Mr. Chairman, are quotations from a paper which I published twenty-six years ago.

The tonsil is a conglomerate of follicles, that means lymph-glands, of the simplest form. They are connected with, or rather separated from, each other by a network of cellular tissue, in the meshes of which colorless and nucleated lymph-cells and fine circular lymph-vessels are contained. The whole surface of the tonsil, composed (as it has been described) of follicles, is covered with a mucous membrane. Between it and the tonsil there is still a layer of parallel fibres of connective tissue. The mucous membrane has its own muciparous glands, and is covered with several layers of pavement epithelium. These epithelia, however, do not adjoin each other very closely; for, according to the researches of Th. Stoehr, there are interstices between them which permit round

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cells to escape between them. The surface of mucous membrane is not smooth or unbroken; it has depressions which Luschka called lacunæ, and Virchow, crypts. It is never the entire mass of a tonsil which is affected by a disease. Even malignant maladies start from single localities or tissues. There may be an affection of the superficial mucous membrane or of its epithelial covering, the subjacent connective tissue, or the dense connective tissue situated between the follicles composing the tonsil, or of these follicles themselves with their scanty lymph-ducts, and, finally, the cellular tissue in which the tonsil is imbedded. The character of the disease, whether more or less serious and troublesome, and the changes brought on by it, whether more or less persistent, depend on its nature, location and extension. The superficial membrane with its lacunæ may be the seat of catarrhal, inflammatory, and diphtheritic processes. There may take place accumulations of mucus, pus, pus and fibrine, and diphtheritic membrane, and mixtures of several of them. In the course of time the mucous membrane itself will undergo changes. Occasionally its muciparous glands exhibit an inflammatory exudation or effusion, and ulceration following the rupture of the vesicles, particularly during a universal attack of follicular stomatitis of infants. Smaller or larger abscesses within the deeper tissue which perforate the surface, destroy part of the tissue and give rise to persistent sinuses, which are found empty or filled with mucus or pus, or pus with fibrine, or cretaceous material, found by E. Gruening to consist mainly of leptothrix and permit of the introduction of a probe to a depth of from one to two centimetres. The superficial indentations and depressions also may become deeper and assume a more irregular shape sometimes in consequence of superficial processes, and partly of the breaking down of the deeper tissues. Thus we are not always in a position to determine whether we have to deal with a transformed lacuna or with an incomplete fistula resulting from the destruction of tissue. As a rule, the former are covered with epithelium, the latter are without it.

The lymph-vessels of the tonsils have remained very

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problematic for a long period. J. Harff wrote an inaugural dissertation in 1876, at Bonn, in which he treated of the anatomical and pathological structure of the tissue of the tonsil. In it he described the circular lymph-vessels, which, as mentioned before, surround the follicles and send very fine ring-shaped nets from within outward. Soon after Sappey published his exact observations in his "Anatomic descriptive," 3 ed., II., p. 892, 1876, and in his great "Atlas," 1882. Injections of the lymph-vessels of the lower surface of the soft palate reach the surface of the right and left tonsils in a newly born child, a foetus, and an infant of from six to seven months. These injections, however, do not succeed in every instance. Whenever they were successful, they went rarely beyond the surrounding cellular tissue; exceptionally only into the follicles themselves. Besides this scanty lymph connection with the velum palati the tonsil has a similar one with the anterior and posterior pillars and the glands adjacent to the common carotid artery. It appears that C. Heitzmann's remark ("Microsc. Morphology," p. 529, 1883), that a large amount of lymph-tissue is stored up in the tonsils, is based on his own observations. These lymph-vessel connections are scanty, as it has been stated. With advancing age they become still more so. They are much less numerous in the adult. It is self-evident, besides, that each hyperplastic proliferation of the connective tissue, which is the direct result of most cases of local amygdalitis, compresses the small array of lymph-vessels and renders them atrophic. By the same process the surface undergoes changes, inasmuch as the normal mucous membrane and its epithelium are replaced by cicatricial tissue. That can be easily ascertained by the inspection of the throats of those who, while not affected possibly by an acute attack, have suffered from amygdalitis before.

Thus, tonsil and tonsil are not identical at all. When we study an acute attack, or a recent affection, we have always to bear in mind the changes which have been, or may have been, produced by previous diseases in the epithelial layers, in the mucous membrane with its muciparous follicles, and the lymph-vessels.

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The surface of the tonsil may be affected, as stated before, with a catarrhal, fibrinous, purulent, or infectious inflammation. The first and the fourth varieties are most frequent at the present time. The first exhibits the usual symptoms of catarrh, viz., hyperæmia and hypersecretion. Actual catarrh of the tonsil produced by cold is not unilateral; it is accompanied with universal hyperæmia of the pharynx. Whenever there is an acute attack with *unilateral amygdalitis*, the latter is the result of either *trauma or infection*. The lacunæ of the surface are, as I said, often changed by previous disease. The new attack is particularly vigorous in their deep recesses, particularly when there are already fistulous diverticles. Then the mucous or purulent secretion is deposited in larger and tougher masses, it is viscid and cohesive, and resembles very much the contents of fistulæ originating from previous purulent inflammation of a part of the tonsil. The more the lacuna is fistulous or the deeper the original fistula, the more local is the course of the whole process, the less the congestion, the more adhering and the dryer is the secretion. But it never forms a structure intimately adhering and cohering with the subjacent tissue. Occasionally a hard morsel of bread removes a part of the secretion, or a sponge, or a piece of absorbent cotton wrapped round a probe are sufficient to detach, or fetch from nooks the drops, or nodules, or membrane-like looking points. It is always easy to introduce a blunt probe into the recess of the lacuna or the fistula. This condition may exhibit an acute character, and last but a short time or it may persist. In that case fibrin is frequently mixed with the purulent mucus. The drop, or nodule, is rapidly replaced by another one. Through weeks and years the same observation and the same procedure may be repeated. Each new attack *may* run its course with or without fever. Sometimes, but rarely indeed, there is some glandular swelling near the lower jaw. It depends less on the local affection, however, than on some accompanying universal pharyngitis or rhino-pharyngitis. Thus the catarrh of the tonsil, of the lacuna, may run an independent course, no matter

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whether acute, subacute or chronic and not attended with any complication. Still, it is self-evident that some complication is possible, for a throat which is subject to catarrhal or inflammatory disposition offers less resistance to an existing epidemic of diphtheria. A much more frequent complication, however, is nasal catarrh of a subacute or chronic character. It is so frequent, that it is difficult in many cases to decide which of the two, rhinitis or amygdalitis with pharyngitis, was the original disease.

Another variety of disease, the visible elements of which are nodules, deposits of different consistence either single or numerous, on either one or on both tonsils, is genuine diphtheria. Its deposit, though of small circumference or thickness, is membrane. While in some cases of catarrhal amygdalitis the deposits—being mucous—may change their very location by a change of position on the part of the patient, or as easily removed by brush or probe, in the diphtheritic form the dots do not change their place, they cannot be displaced without some effort, nor will a probe enter a cavity or fistula through them, or alongside. They are spherical or of irregular shape, whitish or whitish-gray; may be thrown off in from four to five or six days; or they get larger within a day; or a number of them become confluent and merge into a membrane. The space between them, or their neighborhood after confluence has been accomplished, may be pale or congested; fever and glandular swellings in the neighborhood absent or present. The more the morbid process is limited to the tonsils, the more frequently both fever and glandular affection of the neck are absent. But there are cases in which fever precedes the eruption; it may even increase during the presence of the first deposit, and until the completion of the membrane; and recede rapidly in many cases with a favorable result, with or without albuminuria. These severe cases are sometimes accompanied with a moderate amount of glandular tumefaction.

It does not appear difficult to estimate at their full value these cases of punctated diphtheria. But rarely large membranes rise from its basis at once; they are the result of many exudations melting into each other.

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This process of conglomeration being slow, or incomplete, we have a specimen of what is often called by the general name of follicular amygdalitis. The deposits may form from three different sources: either from the normal interstices of Stoehr, or from interstices formed by previous morbid processes, or directly from the pavement epithelium. It is particularly the persistence of the first which has been called diphtheritic angina, or angina lacunaris diphtheritica. It would be better to drop the name.

Albuminuria is not observed in catarrhal amygdalitis, unless there be a high degree of fever. As a rule, this happens only when there is a complication with intense inflammation, or even suppuration. Nor is albuminuria a frequent occurrence in unquestioned diphtheritic amygdalitis, either punctated or membranous, for the very simple reason that the organism does not participate, or participates but little, unless the amygdalitis is complicated. In uncomplicated amygdalitis, the surrounding cellular tissue being tense, and the lymph-vessel connection between the tonsils and the organism being insufficient, the transmission of the poison, from its original seat to the body, is prohibited. The obstacle is still more powerful when previous inflammations have resulted in hyperplastic proliferation. Thus the absence of albuminuria militates neither for the catarrhal nor the diphtheritic nature of the inflammation. Its presence is of some account only when its rising from other causes may be excluded; for nephritis is more frequent than many of us may suppose.

What about fever? Is its absence or presence of any value in the differential diagnosis of the catarrhal or diphtheritic form of amygdalitis? The simple and uncomplicated catarrh of the tonsil yields but few general symptoms, and but little elevation of temperature. However, general pharyngitis and phlegmonous amygdalitis look different. Thus, when there is much fever there is a complication.

The punctated diphtheritic amygdalitis, no matter whether it remains so or becomes membranous, need not be feverish. This fact is sufficiently explained by what I said of the anatomy of the tonsil. To expect fever only

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because a disease belongs to the class of infectious maladies is a (rather childlike) pathological postulation. Even grave sepsis is apt to run its full course with but little elevation of temperature, and the much boasted-of curves, which look quite picturesque in the books and are sometimes furnished by nature, shine too often by their absence. There are cases of diphtheria with high or little fever; fever in the beginning; fever in the advanced stage of the disease, because of more or less absorption of the poison either directly into the blood or through the lymph-vessels, and on account of rapid or slow elimination from the system.

Allow me, in connection with this statement, to return to another one, which does not date from to-day, but which I have often verified and taught, and which will not lose by repetition. Surface diphtheria, without participation on the part of the lymph-vessels, is apt to exhibit no fever, or but little. There is no fever when the affected surface is not connected, or but little so, with the lymph system of the body. Such parts are, besides the tonsil, the vocal cords. Both are covered with pavement epithelium. Both have but little lymph communication with the neighborhood. What I said of uncomplicated diphtheritic amygdalitis is valid for diphtheria of the vocal cords also. A membranous croup without diphtheritic affection of other parts, or complication with a feverish disease, has no fever. Croup symptoms with high fever, but without complication, do not belong to the membranous form. Catarrhal laryngitis begins with fever. Even in cases of an existing punctated amygdalitis, when symptoms of croup make their appearance, the continuance of low temperature stamps the case as membranous; the appearance of high fever renders the catarrhal character more probable. It is not the place here to enumerate cases of which, however, I have seen many corroborative ones in the course of decades. But the subject is one of great importance both for diagnosis and prognosis and treatment. A single case may be mentioned here. On January 1, 1886, I diagnosticated membranous laryngeal stenosis in a boy aged eighteen months, because of the characteristic respiration, and the absence

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of fever, there being no congestion, inflammation, or exudation in the throat. I had to perform tracheotomy a few hours after. Some membrane was expectorated through the tube on the third and fourth days. There was none in the fauces. On the third day, when the wound became slightly diphtheritic, there was an increase of temperature amounting to $\frac{1}{2}^{\circ}$ F. during a few hours. The tube was removed after a fortnight. The child remained well until he was taken with laryngeal stenosis and a high fever, four weeks afterward. He was attended by Dr. P——, who had assisted me in the operation and heard me speak of the differential diagnosis of these conditions. He diagnosed the laryngitis as non-diphtheritic and proceeded accordingly. The child recovered in the usual way.

Fraenkel thinks he can diagnosticate some cases of diphtheritic and catarrhal amygdalitis by the absence or presence of peri-amygdalic abscesses. The presence of the latter, he claims, excludes diphtheria, because he has, so he says, never seen that combination. That reason is rather negative; his not having seen that complications will not prevent him from meeting it some day, and then he will publish another paper on the subject. I *have* seen the combination of diphtheria and abscess; it is not frequent, but it exists. There is no reason why it should not do so. For diphtheria, perhaps, not even those cases excepted in which it enters through Stoehr's interstices, requires a mucous membrane previously affected. No admission to diphtheria through an intact integument. The previous catarrh and inflammation themselves may give rise to abscesses, while they also predispose to diphtheria.

It has been claimed by Fraenkel and others—for instance, by my learned friend, Dr. Holt—that there are so many differences between the course of angina lacunaris and diphtheria that the former is necessarily a special disease. Fraenkel could be right if diphtheria consented to run a typical course, exhibited albuminuria, high fever, paralysis in every instance, and turned out to be fatal in every case. That is, more or less, what has been claimed by some, and the practitioner or author who claims to have seen diphtheria recovering is gently accused of ig-

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norance, or of falsifying his reports on account of ambition or greed. Nothing is more erroneous. Why diphtheria should be observed in the worst form only, when cholera, yellow fever, variola, and scarlatina are permitted to run a mild course oftener than merely occasionally, I cannot understand. If Fraenkel were less particular and less given to schematic differentiation, he would be less troubled about the cases of paralysis of the palate after his cases of alleged follicular amygdalitis. It is true that paralysis is so rare that, "he would fain believe that the case was one of diphtheritic catarrh." There are, however, besides the paralysis of the facial and trigeminus nerves, from intracranial causes, but two ways in which the soft palate can become paralyzed. It may occur in consequence of a general pharyngitis which results in serous effusion into the soft palate, and secondly by diphtheria—as a genuine diphtheritic paralysis. Whenever such a paralysis occurs after a punctated membranous amygdalitis, call it what you please, I call it diphtheria.

Such cases as are described by E. Wagner (in *Jahrb. f. Kinderh.*, xxiii., p. 402), in which diphtheria was developed as late as three days after the commencement of an "angina lacunaris," are by no means rare. Cases in which, without fever, half a dozen or a dozen of punctated exudations merge into a membrane after a day or two are frequent. Most of you have also known of families in which one child died of membranous croup, another had nasal diphtheria and sepsis, another pharyngeal diphtheria, another "follicular," pointed, isolated deposits on a tonsil, or both tonsils, with various degrees of fever and constitutional ailment. Nor are the cases infrequent in which the good-natured and well-meaning practitioner diagnosed a mere "follicular tonsillitis" and "angina lacunaris," and neither isolated nor disinfected, and the malady afterwards, starting from the mild case, desolated the family. Whoever has seen that once must not forget it, and whoever has overlooked it once has enough self-reproach to bear to last a lifetime. Thus this "angina lacunaris" has not such an innocent look about it, "behind which," as Fraenkel says, "affections which are not

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diphtheritic may hide themselves," and in spite of which he advises to isolate the patient; on the contrary, in those cases in which the deposits are firmly attached, and are neither mucous nor purulent, they are diphtheritic, and are to be feared and treated as such.

In the paper published some years ago, and quoted before, I have shown that this variety of punctated diphtheria is mainly seen in adolescents and adults. This fact finds its explanation in my previous remarks on the gradual changes in the tonsillar tissue produced by repeated or chronic inflammations. For this reason the formation of large membranes, and serious constitutional affection, are not frequent among adults. In accordance with this observation is the other fact which has also been stated by Monti, that local and partial diphtheritic angina occurs mostly in bigger children who are afflicted with chronic pharyngitis and hypertrophic tonsils. Thus we can make the broad statement that pharyngitis produces the disposition to diphtheria and relapses in small children, and chronic pharyngitis of long standing suppresses this tendency in those of more advanced age and creates the disposition to localized punctated exudations. But whether membrane or point, the contagiousness of the disease is the very same. A mild variety begets that which is mild or severe, as the severe form may produce its like, or a mild variety. This mild variety is that from which adults are apt to suffer. It made me proclaim the warning that there is as much diphtheria out-of-doors as in-doors, as much out of bed as in bed. With this variety the adult is in the street, in business, in the school-room, in the railroad car, in the kitchen and nursery. With this variety parents, while complaining of slight throat trouble which is not heeded, kiss their children. It appears there is no escape from this mild, murderous variety. But wherever it is suspected it ought to be looked after; where it is seen it must be isolated and treated, less, perhaps, for the sake of those who are sick, than of those who are in serious danger of being infected.



ARSENIC AND DIGITALIS IN PHTHISIS

MANY a case of phthisis, or rather many a case of pulmonary affection known to terminate in phthisis under most circumstances, heals spontaneously or remains dormant. At least we have reason to conclude so when of a number of cases with the same physical symptoms one or more never develop into phthisis, while the others run their complete courses. As the proofs of incipient phthisis we consider catarrh of the apices, which is always attended with the presence of broncho-pneumonic deposits, of either recent or old date; so old, indeed, they may be that the history of their development dates back to infancy or childhood. Many cases of broncho-vesicular respiration over the upper, usually right lobe, diminished respiration, slightly bronchial expiration, moderate amount of dulness on percussion, and retraction of the supra- or sub-clavicular region are the results, quite often, of a single attack of well-remembered inflammatory disease. Add to this a flat chest, prominent shoulders, known hereditary disposition, persistent anæmia, and constitutional debility, tendency to catarrh, and occasional slight cough, and your diagnosis of incipient phthisis leaves nothing to be desired. But this condition does not necessarily lead to pulmonary disintegration and general consumption, but may remain stationary, and even improve to such an extent that the physical symptoms become more normal, the subjective symptoms easier, and the weight increases.

If that be true, and known to be so by every practitioner, if spontaneous recovery may take place, why, the inference is that—this spontaneous tendency being given—recovery is the more possible and probable under the influence of well-directed medicinal and dietetic treatment.

Caseous deposits, both glandular and pulmonary, are often found in post-mortem examinations where death had

occurred from some disease not connected at all with pulmonary disease, in an inert condition; they meant nothing else during all the period of their existence but so much less respiring area. Practically that is phthisis retarded or stopped in its progress. Even repeated attacks of bronchopneumonia, with deposits leading, generally, to consumption, will finally cease, fever and cough will disappear, the general health will improve, and the lungs be in a sufficient condition for practical purposes.

It is only the last stage, when abscesses form, pus will be expectorated, the blood get deprived of albumen, blood-cells become diminished in number, oxygen not be admitted in sufficient quantity because of the scarcity of blood-cells, assimilation be impaired and weight reduced by perspiration, diarrhœa, and sleeplessness—and when finally pus will be absorbed—that the chances of recovery become less. Hectic, like every other pyæmic fever, is apt to lead to death. But even such cases have been known to improve, or recover.

The treatment has to vary according to the stage; the period of gradual preparation, that of inflammatory action, that of pyæmic fever, have their several indications. It *has* frequently varied in accordance with the theories held concerning the nature of the disease. There were those who took *every form* of phthisis for a nutritive and diathetic disorder, those who saw in it a species of inflammatory disease in different shapes and degrees, those who looked upon *every* case and form of phthisis as an infectious disease either of chemical, or as modern bacteriomania will have it, of parasitic nature. These different forms have their different indications for medical treatment.

On the effects of arsenic Isnard wrote a book in 1867. He administered arsenic mainly in malaria and phthisis. In both he explained its usefulness by its effects on the nervous system. He claimed that suppuration, debility, emaciation, vomiting, diarrhœa, and constipation would improve or disappear by it. The doses of arsenous acid used by him amounted to one centigramme (one-sixth of a grain) up to five centigrammes daily.

ARSENIC AND DIGITALIS IN PHTHISIS

If there be any medicine which, besides quinine and mercury, has been called a specific in many diseases, it is arsenic. It is known to act as a poison, and a strong caustic. It prevents putrefaction, though as a real antiseptic it ranks even below salicylic acid. It acts very favorably in malaria, chronic skin diseases, maladies of the nervous system, and has considerable and sometimes unexpected effects in the treatment of lymphoma, even lymphosarcoma. In small and frequent doses it improves connective-tissue growth, it thickens the connective tissue of the stomach, and increases periosteal and osteal deposits. In the latter respect it is surpassed only by phosphorus, on the curative effects of which in subacute and chronic bone diseases I read a brief paper before you a number of years ago. It is also said to improve the sexual desire and power, and the physical courage of animals. Thus there is a variety of effects, the uniform cause of which remains to be found. It can be traced back only, it appears, to the action of the drug on the cell. It is true that the different organs mentioned have cells of different structure, appearance, and function. But in regard to their nutritive processes the different varieties do not differ at all. At all events oxygen acts on all of them in the same manner, albumen is absorbed by them all, and osmosis regulates their circulation equally.

The increase of cell growth in all the tissues mentioned points to the mode in which arsenic must develop its action. It cannot accomplish what it is known to do without local stimulation and irritation, which when moderate improves growth, when exaggerated (by large doses or in predisposed persons) leads to granular degeneration.

Arsenious acid, when in contact with the constituents of the living organic cell, is oxidized up to arseniate acid. This is often reduced again to arsenious acid. Based upon these observations, Binz and Schulz have advanced the theory that the cells are kept in a constant condition of irritation by the changes, which involve an equal variability in the conditions of the atoms of oxygen. Tissues endowed with a rapid metamorphosis must necessarily be

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affected more than others, and those in which the effect of the drug is mostly developed may be destroyed by degenerative processes, while a moderate effect results in irritation only. To accomplish this, it is immaterial whether arsenious acid acts as such or in some chemical combination. Its action, as long as it is restrained within certain limits, has been utilized by Hans Buchner for practical and theoretical purposes. The former consists in its administration for phthisis, the latter in the attempt to fortify the bacillus theory. In his belief phthisis can be prevented by keeping out the bacillus. This is done by stimulating and gently overnourishing the cells, and thereby increasing the power of the organism to resist the invasion of the bacillus enemy. His theory is more shaky than his results. He relies on arsenic as his main medicinal resort in phthisis, and finds fault in Isnard only because of his using arsenic for curative only, and not for preventive purposes. In this remark lies the explanation of the effect which I claim myself also.

Consumption is almost always of long duration. The same nutritive disorder, the same inflammatory attacks, recur frequently during the different stages. Besides the original disposition, there are, then, many attacks, every one of which can and must be treated when perceptible, or prevented before they fully develop. If such prevention be thorough, phthisis will remain dormant. That effect is accomplished by rational dietetics, climatotherapy, and finally by arsenic. I know it has been used formerly in that diseased condition called consumption, but the reporting of new experience does no harm. Besides, where two do the same thing, it is not the same thing after all, and the method of administration is more important than the fact of administering it. Under the permanent use of arsenic the infiltrations diminish, elastic fibres disappear from the expectorations, the strength improves, and the weight increases. Of this result I have convinced myself in a great many cases while they were in the incipient stages.

Trousseau and others recommended arsenic, in chronic pulmonary catarrh and asthma, in the shape of cigars.

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The indications in many cases are correct, the method of administration is very much less so; for there is no remedy the doses of which are less subject to, and tolerated in such uncertainty, as the smoking of arsenic cigars would imply.

Small doses of arsenious acid do not interfere with the efficiency of saliva, and gastric and pancreatic juice, nor is the stomach itself affected by it. In some cases there is a slight sensation of pain or hunger, the result of which is increased appetite, and ingestion of food. However, as this larger amount of food is not followed by indigestion, the powers of the stomach must be presumed to be increased. Undoubtedly the innervation of that organ is improved. For this reason only, the general nutrition is improved also. This effect is so well known to farmers and veterinary physicians that animals are supplied with arsenic for the purpose of strengthening and fattening. Its use among miners is well known. In many cases of anæmia it is the best alterant and nutrient.

Hans Buchner asserts that the incipient stage is not the only period in which arsenic proves effective. That is true. It has the same, or rather a similar, beneficial effect in the later stages. But he claims that complete recovery has been accomplished in the most severe cases, that perspiration and fever will cease, the pulse become less frequent and stronger, and the vital capacity increase even in far-advanced cases. This I believe to be overdrawn. Particularly in regard to the hectic fever I have almost always been disappointed. I believe that even digestion was not at all improved by arsenic in that stage. Thus it has become my rule, not to prescribe arsenic at all while the fever is high, but to begin or return to it as soon as the temperature has a tendency to become normal. When I acted on that plan I had very often the satisfaction of improving the condition of very doubtful and far-advanced cases.

The doses ought not to be large. Nausea, colic, diarrhœa, œdema of the eyelids are contraindications to the continuation of its use. One-fifteenth, or one-tenth to one-sixth of a grain of arsenious acid, daily, is a sufficient

dose for an adult if it is to be continued for a long time. In order to render it less liable to give rise to disagreeable symptoms a little opium may be administered with it. In most cases of incipient phthisis this combination is pleasant and useful. In such as show intestinal symptoms at an early period, its joint administration is a particularly happy one. Still it may be remembered that gastric symptoms, attending the use of arsenic first, will be apt to disappear soon.

The preparations I use are either arsenious acid or Fowler's or Pearson's solution. The former it is best to give as a pill, in such combinations as I shall allude to shortly. Fowler's solution, three drops, or Pearson's solution, six drops, three times a day, in a few ounces of water, administered after meals, and gradually increased, will act favorably. In but few cases the former had to be exchanged for the latter, because of the tolerance of the stomach.

In connection with the above remarks I venture to submit a few words in regard to another remedy which I believe to have been beneficial in a great many of my cases. Again I have no new remedy to advise, but desire to state that an old one has, in the course of three decades, aided me much in relieving my patients. If I speak of as trite a drug as digitalis, I may be permitted to add, that while nothing that I say may appear new, it has seemed to me as if from year to year I learned better how to use it.

In the vertebrate, digitalis increases the energy of the heart-muscle and the volume of its contraction. Thereby it increases arterial pressure and diminishes the frequency of the pulse. In this connection it is of no consequence whether the irritation of the inhibitory nerve is the primary or the secondary element. By increasing the pressure in the arteries, besides favoring the secretion, of the kidneys, it improves the pulmonary circulation, empties the veins, and thereby accelerates the circulation of lymph and the tissue fluids. Thus while having an immediate effect upon heart and lungs, it exerts a powerful influence on the metamorphosis of organic mate-

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rial, assimilation and elmination, that is, nutrition in general.

Thus both the local and general effect of digitalis are invaluable in all the stages of phthisis. While, however, they may relieve in the last, they are a healing element in the first stages. The congestive and nutritive changes constituting the preparatory, and, in part, the advanced stages of consumption, are favorably influenced. I seldom treat a case of phthisis without it. Very little care is required to avoid disagreeable results. Cumulative effects are either the consequence of excessive or too frequent—unnecessarily frequent—doses, or of the selection of improper preparations. Such as are soluble in water with difficulty only, ought not to be used, for it may happen that, having been inert for some time, a large amount may enter the circulation at once. Particularly is this true of digitalia, which is by no means a soluble alkaloid, but a crystallizable glycoside. I use the infusion, the tincture, the fluid extract, the extract. Their relative values I do not desire to discuss, except in regard to their advisability in phthisis, and the possibility of continuing them for a long time. Patients of that class we see from time to time only; they require advice and prescription for a protracted period; as a rule, their digestive organs are among the first to suffer; indeed many an alleged dyspeptic patient is affected with gastric disturbances first, and has his attention drawn to the lungs by his physician, who discovers the cause of his gastric catarrh in the retarded circulation of heart and lungs. In this case the stomach exhibits the peripherous symptoms of the distant diseased organs in the same manner in which a local disease of the brain or cord shows itself first, in affections of peripherous nerves. Now, whenever the stomach is much affected, neither the tincture nor the infusion is tolerated long. The latter may be given in three daily doses of half a tablespoonful each, or in two, of three teaspoonfuls each, for some time. But I seldom risk to recommend it for more than five or six days in succession without seeing the patient. The fluid extract has often disappointed me, I cannot tell why, nor do I claim to know why. What

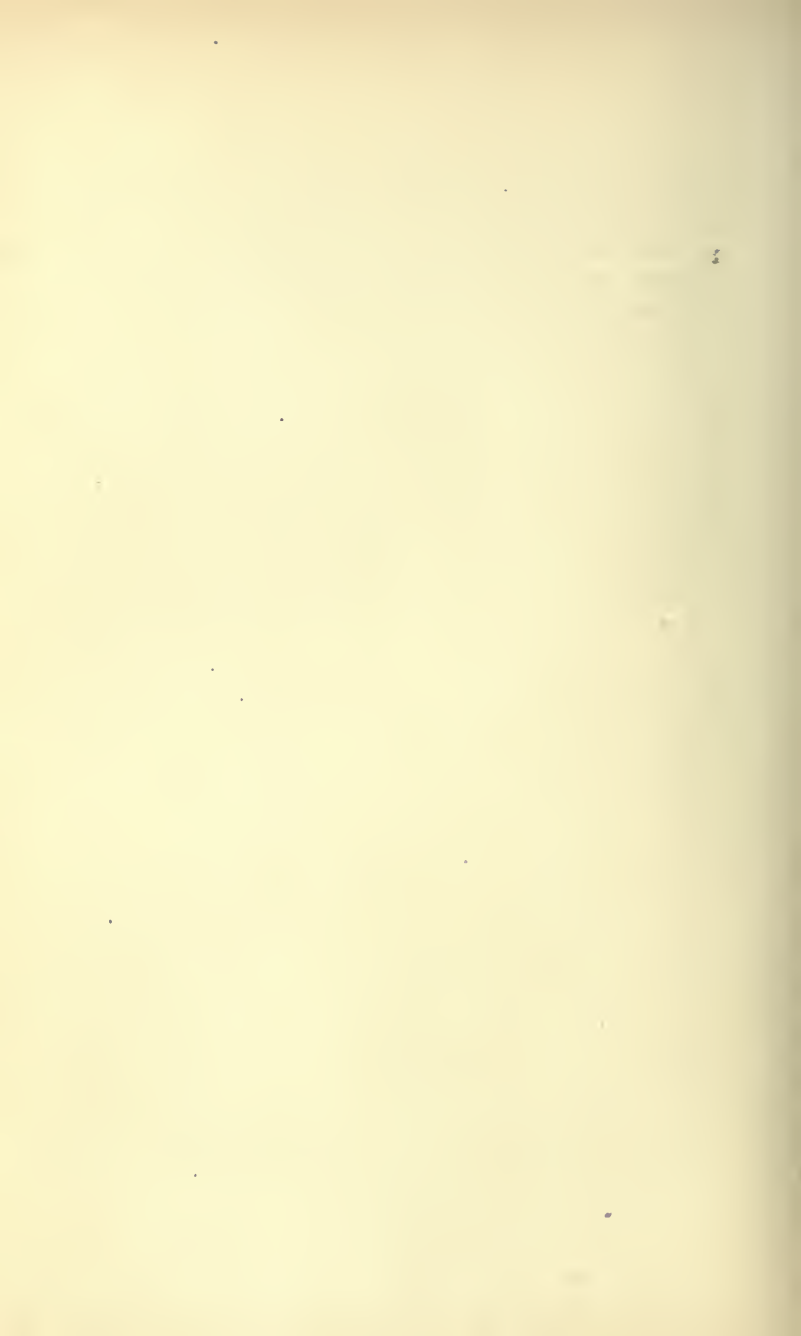
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I mean to report is merely my experience. My main reliance is on the extract; my almost universal method of giving it is in the form of a pill, in such combinations as will suit the individual case. The stomach does not object to it, taste is not offended by it. I often prescribe one and one-half to one and three-fourths of a grain, corresponding with three and a half times its weight of digitalis, for weeks, without expecting to see the case again. It combines with extr. nuc. vom., with iron, with arsenic, with quinine in small doses, with extr. belladonna or extr. calabar, with extr. coloc. cmp.; in fact, with anything. Such combinations are frequently required in the early stages of consumption. The general muscular system requires toning up, the intestinal muscle requires strengthening, the intestinal tract evacuation, the intestinal and abdominal circulation easing. At the same time iron, as I mentioned, may be added, when there is no fever; or caffen, for its stimulant effect on heart and arteries.

Speaking as a general practitioner before a meeting of almost exclusively general practitioners, I desire to add, in this connection, a single remark on the general usefulness of digitalis in other cases. Every chronic disease, and the results of the wear and tear of what is called civilized life, has a depressing influence on all parts of the organism. The heart is not the last to suffer. Its muscular strength is tasked every second, it is the very organ which cannot and must not rest. Stagnation in an outlying province will overexert it, ill nutrition of the nerves will influence it, general anæmia exhaust it, infection paralyze it, weak circulation or venous obstruction interfere with its structure and strength. Now what alcohol and ether are to the nerve, strychnia to the muscle, that is digitalis to the heart, unless in a condition of myocarditis. The increase of arterial pressure it produces is beneficial not only to outlying provinces, it is so to the circulation and nutrition of the heart-muscle itself: Thus in all cases of general anæmia, in slow convalescence, where iron and nux are called for, digitalis

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is also required. It strengthens the heart, propels the blood in its own fibres, and shortens the period of recovery. I have learned to look upon digitalis, for restoring vigor and strength, as more than a mere symptomatic; I consider it to be one of the best tonics, along with iron, nux, and arsenic.



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ORGANIC cardiac murmurs have always been distinguished from the accidental and the functional. It is self-understood that the first named are caused by actual, mainly valvular, diseases, and will remain as permanent as the anatomical changes which produce them. Accidental¹ murmurs should be called those which, though they appear to be cardiac, do not result from actual cardiac disorders. They may even be extracardial, and sometimes require great attention and repeated examination before their true character can be ascertained. They depend on adhesions between the pleura and pericardium, with or without those between the two pericardial layers; are not transmitted through the blood-current, not always rhythmical, not quite synchronous with the contractions of the heart, and not of equal strength and audibility. Some, according to their origin, are superficial, some distant, grating (pericardial), or soft (pulmonary), increase during expiration, and may stop altogether when breathing is intermitted. They are seldom heard posteriorly.

Changes in the shape of the chest-wall, such as annoy the heart, alter the character of the cardiac sounds. In three cases of rhachitical infraction of ribs Hochsinger observed distinct cardiac murmurs; Steffen the same in the common forms of rhachitical deformities of the chest.

¹ Dr. George W. Webster, of Chicago, in a paper read before the American Medical Association of 1899, proposes to do away with the discrimination of "accidental" and "functional" murmurs and to employ the former adjective exclusively. He claims that "it commits us to no theory of causation, indicates no pathology, and avoids a discussion of the question whether functional disturbances occur with pathological changes." But it is exactly this discussion which is urgently required. Without it the difficulties surrounding the etiology and nature of inorganic murmurs will not be overcome.

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These forty years I had many opportunities of publicly demonstrating, with or without apparent hypertrophies of the heart, more or less marked cardiac murmurs attributable to the triangular or quadrangular shape of the rhachitical thorax, the walls of which, being no longer elliptical, touch a large surface of the heart. These murmurs are not always the same. Within a few minutes the well-marked cardiac murmur of a baby sitting erect or bent forward may change into a muffled sound when the patient lies down—the best proof of its resulting from the mechanical annoyance on the part of the chest-wall. Indeed, this muffled sound and the murmur differ only in degree. The former may often be produced by the pressure of the stethoscope on the flexible ribs of the young. Such observations, as noticed by Henoeh, and also by Hochsinger, who, however, speaks of a coarse heart-sound only, may readily be verified, provided the age of the patient is taken into account. They will be the more positive the younger the baby and the more flexible the ribs. Now and then the cardiac sound may be changed by pressure over the pulmonary artery.

“Functional” should be called all those murmurs which cannot be explained by some anatomical alteration of a valve or of the myocardium. The causes, however, which are responsible for the exhibition of functional murmurs are altogether too numerous. To say that no single theory covers their etiology is not doing justice to the case. Indeed, there are but few conditions of the heart and blood-vessels to which “functional murmurs” are not traced back. Thus the imagination, or the diagnostic skill—or its absence—of the writer had always a great deal to do with their alleged nosogeny. Protracted diseases and convalescences, losses and abnormal condition of the blood, all forms of anæmia, chorea, poisoning by alkalies or by acids, acute intoxications and long-continued eruptive fevers, septic processes, irregular contractions of the myocardium, degeneration of papillary muscles, minute disturbances of valves or of bloodvessels, chronic myocarditis, fatty degeneration, are all charged with causing “functional” murmurs. Nervous influences also come in for

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their share. Undoubtedly strong emotions, excitement, mainly in the young and those very impressible, influence the heart in the most various ways, from temporary palpitation to change of structure. Prolonged emotional strain certainly has that effect, even to the extent as to cause distention, dilatation, and hypertrophy, through prevention of complete systolic discharge equally with physical over-exertion. Before and after violent exercises of athletes Schott could discover under the Röntgen rays the different degrees of distention. This momentary distention, when exertion is demanded of an enfeebled heart, though otherwise healthy (for instance, in chlorosis), may lead to persistent dilatation. When the heart is no longer healthy, however (for instance, after infectious diseases, or in fatty degeneration, or in the various degrees of other myocardial changes), both distention and dilatation are more readily established. Nor are pathological alterations required to facilitate their development; for here fatigue, physical, emotional, or mental, renders muscles more flaccid and favors distention. As far as the heart is concerned, its muscular labor depends, moreover, on the amount of support it finds in neighboring organs. The inability of lying on the left side, which is experienced by most healthy people, is caused in this manner. In that position the heart is more flaccid and requires more exertion to overcome resistance, a fact which is best shown by the increase in the number of respirations of from 50 to 80 per cent.

Functional murmurs are described as soft and low, short or long, not always blowing, and are frequently combined with, or are the terminations of, a more or less normal heart-sound. In almost every instance they are systolic; in the adult they are mostly aortic, and then audible in the carotid; in the child they are more frequently found over the pulmonary or over the pulmonary and mitral regions. In regard to the locality and extent of their audibility there have been many differences of opinion; still, there appears to be unanimity in regard to their inaudibility posteriorly in almost every case. A functional murmur may persist for weeks and even months, but it has not the uniform quality of an organic murmur. It is more or less

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soft, or loud, or prolonged. Many disappear quite rapidly, or, after having vanished, return. In this respect they differ widely from organic murmurs, which are more persistent as far as time and character are concerned. It should, however, not be forgotten that organic valvular murmurs may disappear either through recovery from endocarditis or through the establishment of compensation. But in these cases they diminish in loudness and duration very gradually only. Nor should it be overlooked that an increased frequency of the pulse, with its frequent and insufficient contraction of the heart muscle, and thin blood-vessels, and shortened valve excursion, conceals a murmur which was present when the pulse was slow, or which returns when a cardiac stimulant reduces the number of heart-beats.

Duplicated sounds should almost never be taken to be either accidental or functional. They are nearly always organic and of more value than Leube appears willing to assume, both the splitting of the second sound (gallop rhythm—VV) and that of the first (VV—"rappel" of the French). The former is often observed in aortic stenosis, in chronic nephritis, sometimes also in conditions of utter exhaustion, and in bad cases of chlorosis; the latter in mitral stenosis, sometimes with oliguria followed by polyuria. Both of them are rare in infants and in the very aged. A fine specimen of the last anomaly has been under my observation (Charles G., ten years old, with the diagnosis of mitral stenosis and chronic myocarditis) in my division of Roosevelt Hospital.

Vascular murmurs should not easily be mistaken for cardiac; as a rule, they are transmitted. They are very rarely confined to the arteries of the neck, either in the adult or in the young. The relatively large size of the carotid in the young, mainly in the rhachitical young, with its lowered blood-pressure, may give rise to an occasional soft murmur. This infantile condition of the carotid (and basilar) artery accounts for the murmur which is often audible over the open fontanelle, and was (rather erroneously) attributed by Fisher (Boston, 1835) to rhachitis only; it is quite possible that the irregular shape of the

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rhachitical carotid canal contributes to the murmur, which has always been mentioned among the "functional." If, however, the large size of the artery, with its consecutive diminution of blood-pressure, or an anatomical change in the carotid canal, or both, cause the murmur, to what extent should we be justified in calling functional the murmur which is due to such tangible anatomical causes?

Venous murmurs should never be mistaken for those originating in the heart. They are frequent, mostly about the chest and neck, and generally found in anæmic adults, less so in anæmic children, still less in infants, and never, it appears, in babies suffering from atrophy. The jugular vein is a frequent seat of murmur, particularly when the bulbus v. jugularis is large compared with the size of the vein; in these cases the murmur is explained by the formation of a vortex. The v. anonymæ also exhibit murmurs, which are combined with those of the jugular, are heard on both sides of the sternum, and are not isochronous with the sounds of the heart. When such murmurs are complicated with those of the apparently normal heart in adults, it is mostly safe to claim the latter as functional; when in children, and particularly in small children, as organic, for the number of very young children that develop other than organic murmurs is small. That is why while venous murmurs are frequent in pernicious anæmia, leucocythæmia, scurvy, and hæmophilia of the adult, even when cardiac murmurs are still absent or not marked, they are often missed in those of the young child. In fifty cases of infantile scurvy I do not remember to have ever met them. Why should this be so?

The heart of the young is comparatively large, heavy, and healthy. Its weight in the newly born is 0.89 per cent. of the body-weight; in the adult 0.52 per cent. In the newly born the cavity, however, is small, 23 c.cm., compared with 100 c.cm. at the seventh and 140 c.cm. at the fifteenth year. Its muscle is massive, equally thick on the right and left sides, the contractions rhythmical and energetic and quite frequent. That is why the valves, which are small and elastic, vibrate easily and quickly. During the first five years there is an increase of the

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heart in bulk and weight, but none in circumference. That is why, while the area of dullness in early age is extensive, the impetus is quite marked. The cavities dilate rapidly only after the fifth year, and the large arteries, mainly the carotid and subclavian, lose their disproportionately large size only after the seventh year.

This condition of things prevents a predisposition on the part of the infant heart to murmurs of any kind. Indeed, they are very rare in the first four years. In regard to this fact, which was clearly stated by me in 1888,² the authorities do not always agree. Fifty years ago Charles West expressed the opinion that they were frequent, but it is very probable he mistook or meant vascular murmurs. Gerhardt thinks they are rare; Biedert and Steffen, however, frequent. Bouchut believed them to be very frequent, under the impression that what he described as a proliferating endocarditis (*"endocardite végétante"*) in the newly born must necessarily cause murmurs. What he so denominated was, however, nothing but Albini's valvular nodes, or the "blood-cysts" of Luschka and of Parrot, recently again described by Giovanni Berti (*"noduli ematici delle valvule cardiache,"* 1898)—that is, small elevations on the lower side of the valves containing or depending on minute hemorrhages. They are very frequent and liable to disappear, but do not always do so, for I have seen many a case, and followed it up to advanced age, in which those nodules must have been large enough to result in the systolic murmur observed by me which proved persistent. They are apt to be on the mitral valve, are found in the newly born, and persist, and suggest the diagnosis of intrauterine heart disease; but are found in the left cardiac cavity, contrary to the rule according to which foetal inflammation or arrest of development occurs in the right side, and do not result in either dilatation or hypertrophy. Such cases, the like of which I have an opportunity to demonstrate in my clinic perhaps

² Brooklyn Medical Journal, March, 1888: "The heart exhibits functional murmurs but seldom. Whenever there are murmurs present in the infant, it is safe to attribute them to organic disease rather than to mere functional disorder."

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once a year, do not seem to have been observed by Hochsinger when he absolutely and positively denied the occurrence of cardiac murmurs within the first few years of life. Surely these murmurs when found cannot be called functional; they are organic.

Still, these cases are exceptional, and do not controvert the fact that the normal anatomical condition of the infant heart is too powerful to admit the presence of merely functional murmurs. There are but few cases of undoubted functional murmurs in the infant on record. Thiemisch³ claims one. He tells of an anæmic rhachitic baby of six months that died of pneumonia. A distinct systolic murmur was heard at the apex for a week before death; it was surely not extracardial, for it was distinctly heard in the intervals of respiration, and at the autopsy no valvular lesion was discovered. That is why the murmur is called functional. Still, we are told that the heart was slightly large (may be, within normal limits), and that the muscle of the right ventricle was very pale and flabby. This latter condition means a myocardial anomaly, which is quite capable of rendering cardiac contraction incompetent and irregular when it is localized on one side only. It is more probable that such a limited localization has that effect, while we may imagine that if the myocardial change were universal and equable, the contraction, though feeble, would also be equable.

In more respects than for merely anatomical reasons, the first years of life are peculiarly immune in regard to some of the changes which in advanced life give rise to murmurs. Tobacco, alcohol, tea, coffee, gout, and uric acid have not had time to work; hereditary syphilis does not attack the heart so often as the acquired form, erythematous and fatty degeneration of the heart and of the large arteries are exceedingly rare; brown atrophy of the heart is uncommon; the coronary arteries are normal; the myocardium, with the exception of thin deposits found on circumscribed parts of the pericardium, mainly near the insertion of the inferior cava and on the apex, does not suffer until some infectious disease has had an opportunity

³ Jahrb. f. Kinderh., vol. xli.

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to affect it. After all, it appears fair to assume that the appearance of murmurs, no matter of what name, requires the presence of some changes in the cardiac structure which in most cases should be ascertainable.

Murmurs are caused by congenital heart diseases, which are frequent. Generally these prove fatal within a few years, with the exception of defects in the ventricular septum and of the occasional cases of subacute or chronic endocarditis, which are sometimes met with in pale and puny children without a history of traceable causes, that may have been unrecognized rheumatism or some other infectious disease. That is the more probable the less the symptoms of rheumatism are pronounced in the young. As early as 1875⁴ I could point out what has been confirmed since, that local pain and swelling, even fever, may be less marked in the rheumatism of the young than in that of the adult, and still endocarditis is more sure to come and more frequent—indeed, sometimes the first and almost only symptom. Besides, rheumatism, whether ushered in by pharyngeal infection or otherwise, is more liable to be monarticular in children than it is in adults, and, therefore, liable to be overlooked. That is why many a case of rheumatic arthritis has been taken for traumatic, and *vice versa*. A girl of seven years entered my ward in Roosevelt Hospital with an old double, very coarse, and hard mitral murmur and a painful left shoulder; had a new attack of endocarditis, followed by pericarditis and pneumonia in the two lower lobes; was still kept in bed, when four weeks afterwards the left shoulder was taken, and had not left the ward when, three weeks after, the left foot was attacked with a new endocarditis. In the intervals she was free of pain and fever for weeks in succession. Thus three successive attacks of rheumatism, between which she appeared to be rapidly recovering, were monarticular.

What I mean to emphasize is this, that the absence of a history of rheumatism or some other infectious disease does not prove the non-existence of the latter. The variability of the symptoms, the difficulty of diagnosis, the ab-

⁴ Seguin's Lectures, vol. i. No. 11.

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sence of intelligence or experience in the parents, are just as many impediments to the correct appreciation of the present murmur. A systolic mitral murmur in a small child may easily be taken for functional when there is no history to explain it. The fact is, however, that while "rheumatism" is vehemently denied, "growing pains" are admitted, either with equanimity or with pride.

Murmurs are often, probably mostly, occasioned by an uneven pathological endocardial surface or by the incompetency of a valve. This incompetency may result from structural change or from faulty innervation. Bloodvessels, also, in order to facilitate the production of a murmur, should have an uneven surface; mere narrowness does not cause it; for in several cases of congenital chlorosis in girls with narrow, but probably smooth, arteries, I never found a murmur, nor was there one in the case of a baby, fourteen days old, with narrow arteries, that was described by A. J. C. Skene in the *American Journal of Obstetrics*, 1876. In two others, five and seven years old, I did find in the aorta and carotids murmurs which persisted as long as the children were under observation, without other anomalies, and without an opportunity to make a thorough diagnosis.

The occurrence of cardiac murmurs in abnormal conditions of the blood appears to admit of no doubt in adults, no matter whether they are due to them alone or to structural or functional changes in the heart and bloodvessels. The latter—*i. e.*, functional changes—should be doubted as long as the altered function may be explained by the altered structure. In chlorosis, scurvy, hæmophilia, leucocythæmia, and pernicious anæmia of the adult a murmur is seldom absent; in the same conditions of the child, particularly of the infant and young child, it is rarely present. When we remember the superior development and the undisturbed condition of the young heart we feel obliged to attribute the absence and the presence of the murmurs, as the case may be, to the condition of the heart and not to that of the blood. Thus we should not be too anxious to claim any of the murmurs observed in the above-mentioned conditions as "functional," to the absolute

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exclusion of an organic origin. Similarly do we find that chorea, for instance, in the adolescent and adult that had many years to develop the rheumatic or other infectious form of valvular disease, is almost always attended with a murmur, while there are many cases of the same complex of symptoms in the young not so attended. It is only in those cases in which a murmur appears and rapidly disappears, and is again observed after an intermission of hours or days, that we are fully justified in believing it to be functional only; for though it be the result of incompetence, either of muscular strength or of innervation, the structural changes, if any there be, cannot be very radical. Such differences are, to mention another instance, exhibited in bad cases of masturbation, which when excessive will cause a cardiac murmur in the adolescent or adult, but never once in the forty years during which I observed many hundreds of cases in the very young. Another instance is that of rapid growth, which, in the very young, does not result in a sufficient disproportion between the heart and the body to cause a murmur, while adolescents mostly exhibit it as a symptom of cardiac incompetency.

In all these cases it appears that it is the condition of the heart which causes the murmur, but neither the blood nor an abnormal process of general nutrition or development.

In chlorosis the sounds of the heart are variously changed; there is frequently a systolic and now and then a diastolic mitral murmur, not always persistent; the second sound is duplicated in bad cases only. Nor is the presence of fully developed chlorosis required to yield these alterations; neurasthenic young women may exhibit the same changes; they are also found in some cases of lead disease. In most instances the patients are pale and nervous, the pulse is small; nose-bleeding may be frequent, but dropsy there is none. It appears, therefore, that nervous influences alone are sufficient to cause temporary murmurs. Indeed, there are those who retain the existence of a spastic contraction of the mitral orificial ring without any organic alteration. According to H. Audeoud and Ch. Jacob-

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Descombes,⁵ Revilliod teaches that there is a temporary mitral and orificial narrowness. Constantin Paul describes a murmur, either soft or rough, over the pulmonary artery, complicated sometimes with a jugular and mitral murmur, which he attributes to the co-operation of anæmia and of spasm. Huchard assumes the presence of a spasm of the coronary artery with symptoms of angina pectoris; he also speaks of "pseudo-angina" in nicotinized neurasthenics. Foville discriminates two kinds of spasm, one of which terminates in palpitations, the other in syncope. In all their cases and those of a few others there were some symptoms referable to the alleged changes; in some there was an increased area of dullness; in others there were either pulmonary, or mitral, or vascular murmurs, which would not persist, but disappear and return.

Dombrowski speaks of an organic and of a functional insufficiency and stenosis of the aorta and of the tricuspid. Drasche, Heitler, and Dombrowski report cases of functional mitral insufficiency caused by feebleness of the myocardium. Among others, Austin Flint described long ago cases of presystolic murmurs referable to mitral stenosis, when there was much aortic insufficiency, but at the autopsies nothing mitral. Thus both spasm and incompetency are believed to cause murmurs. Both may be explained by insufficient innervation, and murmurs thus produced deserve to be called functional as long as the anatomical condition of the nerves whose physiological action is at fault cannot be calculated or even estimated. The complexity of the anatomy and physiology of the centers in the medulla and of the peripheral nerve branches is so great as to render every attempt at exactly weighing their abnormal action perfectly futile.

Leaving the field of neurology we are on much safer ground when considering the normal and abnormal action of the heart, mainly in regard to the origin of murmurs, in connection with the condition of the heart muscle, which has not had the attention it deserved bestowed upon it until a few years ago.

⁵ Les altérations anatomiques et les troubles fonctionnelles du myocarde, 1894, p. 119.

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Endocarditis and pericarditis have until a short time ago attracted the principal attention of clinicians. Indeed, the lesions of the myocardium were extensively studied by pathologists before their results were utilized in the interest of diagnosis and practice. And still there is no period of life in which the muscle of the heart may not be of pathological interest. Even coarse lesions may be found in early infancy, besides those congenital chronic cases of endocarditis and arrests of development which lead to cyanosis. In Gerhard's *Handbuch*, twenty years ago, Dusch published fourteen cases of acute and seven of chronic myocarditis, and seven cases of aneurism of the heart, five of which were in the ventricular system, two in the wall, in children. Diverticula of the heart have been found even in the newly born, also intertrabecular defects; they were sometimes of syphilitic character.

Of the latter variety was that found by J. Arnold⁶ in a syphilitic female one and one-half months of age. Syphilis will probably be found in many more instances of congenital heart disease than have been hitherto recorded. If so the lesions will not necessarily be confined to the right side.

In advanced age myocardial changes are frequent. Their causes are numerous; indeed, most diseases affect the heart muscle. Not to mention the results of thrombotic and embolic processes which lead to anæmic necrosis, to septic infarctions, or to fibrous myocarditis, we meet with acute myocarditis mostly in infectious fevers, accompanied with swelling of the intermuscular cellular tissue, minute extravasations, and sometimes fatty degeneration. The same infectious fevers, also the presence of endocarditis or pericarditis, may give rise to granular degeneration of the parenchyma of the heart muscle to such an extent as to obliterate the striated structure. This is the condition which was formerly attributed to the influence of excessive body heat only. Fatty degeneration, mostly of the left ventricle, depends on the failing nutrition of anæmia, cachexia, age, or fevers, and complicates changes in the pericardium and in the coronary arteries. Fatty overgrowth

⁶ Virchow's Archives, vol. cxxxvii.

FUNCTIONAL CARDIAC MURMURS

of the pericardium or between the muscular striæ is often found beyond middle life; brown atrophy, with its pigmentation mostly about the nuclei, which follows valvular disease and is met with in the senile heart; amyloid degeneration of the connective tissue; amyloid or hyaline changes in the bloodvessels, with their influence on the nutrition of the organ; and calcareous deposits, small or large—all of them are frequent, and many are found in autopsies after no symptoms pointed to their presence. Still, there are often symptoms caused by them. There may be dyspnœa or angina pectoris; the pulse may be feeble, irregular, frequent, or slow; the cardiac rhythm galloping, the sounds replaced by murmurs. Indeed, murmurs are a frequent result of myocardial changes. I have seen them coming and slowly going, when they could be explained by nothing else. That parenchymatous changes in the heart muscle, and still more that interstitial inflammation of the connective interfibrillar tissue, should get well under the influence of tonics and rest and medication, can be denied only by those who have not seen the different stages in the same processes—invasions and recoveries—in other organs. The correct estimation of myocardial changes in the living, however, is beset with peculiar difficulties, mainly in this, that they may be local and not accessible to percussion. Even thorough and universal myocardial alterations need not change the size of the organ.

A few conclusions appear to be self-evident:

1. The diagnosis of deranged function in any organ is only a makeshift, and justifiable only as long as we are ignorant of the physical cause of that derangement. A functional heart murmur is one the anatomical cause of which we do not know. That is why a skilled diagnostician may recognize fewer functional murmurs than one who will not diagnose a heart disease unless he have all the symptoms, including dilatation and hypertrophy.

2. The same disorders of the blood and nervous system in which heart murmurs are observed in the adult do not cause them in the small infant. In the latter the heart is larger, more massive, and more powerful, and its con-

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tractions are more uniform and effective; its two ventricles are almost equally muscular, and the valves are smaller. Thus the greater frequency of murmurs in the adult is attributable to the physical condition of his heart, and should not be explained by a deranged function.

3. Even in the present limitation of our knowledge we should agree to call functional only those murmurs which are temporary, or intermittent, or variable in their character. They are met with in the neurotic and neurasthenic, in the (adult) anæmic, sometimes in syncope or in chorea minor, and occasionally in rheumatism. Even here they should be recognized either as myocardial or as neurotic.

THE INFLUENCE OF MENSTRUATION, PREGNANCY, AND MEDICINES ON LACTATION

PREGNANCY and lactation are incompatible. It is but a rare occurrence that a woman should have strength and blood in sufficient quantity to sustain herself, a nursling, and an embryo or fœtus besides. Therefore,¹ as early as 1758, a law was passed in France, according to which wet-nurses had to inform their employes of the occurrence of another conception. Not very rarely will the uterus not be able to resist the persistent mammary irritation kept up by nursing, and the fœtus is expelled. The milk of pregnant women undergoes a certain number of changes. According to N. Davis, the solid constituents decrease, particularly fat, salts, and casein; and the milk assumes the nature of colostrum. The changes brought on by menstruation are analogous, according to the same author, although not so complete. Ch. Marchand examined three specimens of milk, one of six days before menstruation, one during menstruation, and one six days after menstruation.

Six Days before Menstruation.

Butter	..... 32.24	28.56	37.24
Milk-sugar	..... 68.25	69.31	69.75
Casein and albumin.....	20.20	16.75	18.40
Salts	..... 1.90	1.74	1.82
Water	..... 877.41	883.64	872.79

During Menstruation.

Butter	..... 27.45	30.32	33.15
Milk-sugar	..... 65.46	65.15	64.42
Casein and albumin.....	21.34	17.21	19.10
Salts 1.98	1.80	1.89
Water 883.77	885.52	881.44

¹ Ullersperger Pædiotrophie, etc., p. 91.

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Six Days after Menstruation.

Butter	29.41	29.24	35.54
Milk-sugar	69.15	68.87	68.95
Casein and albumin.....	20.90	16.47	16.27
Salts	1.89	1.82	1.72
Water	878.65	883.60	877.42

Thus, there is during menstruation, a marked diminution of milk-sugar, a trifling diminution of butter, and a trifling increase of albuminous material.

The above results agree with those obtained by Becquerel and Vernois, who found sugar diminished (40.49: 43.88), and albuminates and extractive material increased in quantity (47.69: 38.69). They assert they experience no injury to the infants, nursed by menstruating women.

In general, milk-sugar and albuminous contents appear to keep up a somewhat inverse proportion; while the latter are increased, the former diminishes in quantity.

Besides, from a few observations made, it appears that milk-sugar is always found lessened during the duration of a uterine affection, be it hemorrhage, or catarrh of uterus or vagina.

In addition, there are certainly differences in the condition of the milk, which can be appreciated or estimated, particularly as to size. The milk corpuscles—all of them spherical, refracting light, and enclosed in a membrane consisting of insoluble albuminates—range from 0.00125 to 0.004. Fleischmann divides them in three classes, large, middle-size, and punctiform. The first he found in old women, in protracted lactation, in fevers, and during menstruation.

But still opinions differ as to whether menstruation contraindicates nursing or not. For it is true that there are many observations of colic, vomiting, and acid diarrhœa on the part of the nursling, but just as many of entire euphoria during the menstruation of wet-nurse or mother. It is customary, when menstruation makes its reappearance, either to wean or to change wet-nurses. But in very many cases nursing is persisted in for the purpose to prevent

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both menstruation and pregnancy. For the functions of the mammary glands on the one hand, and those of the ovaries and uterus on the other, were considered to evolve each other. Such an evolution, however, does not exist. Pregnancy may occur without menstruation, no matter whether lactation is going on or not. I had a patient who never had a child during her married life, for a number of years. When she applied to me, she had not menstruated for ten months. Her uterus appeared rather too large for a normal condition; the uterine sound, introduced for diagnostic purpose, destroyed a two months' fœtus. Nor is this the only case of pregnancy commencing during amenorrhœa. Cases will be met with occasionally in the journals; and would be so more frequent, if practitioners were as anxious to instruct their professional brethren by the mistakes they made, as they are apt to be to benefit them by the successes. During lactation, pregnancy is not infrequent, no matter whether menstruation is regular, or reappeared, or disappeared again. Meanwhile, the secretion of milk may be quite copious, and exhibit no very apparent alterations.

In general lactation is persisted in, and is dispensed with at the expiration of nine or twelve months. At this time menstruation has usually reappeared and is regular. That length of time is also required to fully re-establish uterus and ovaries without regard to lactation. The advice of the English author, who wanted women to nurse their babies through a period of four years, is therefore but poorly sustained by reasons. His were three. The first was, that the babies were thus fed both well and cheaply—but that mode of feeding would, indeed, be neither good, nor cheap, nor sufficient. His second reason was that the woman would escape a renewed pregnancy and the domestic misery emanating from the abundance of unwished-for children—which is contrary to the established facts. Thirdly, he urged that procedure for the purpose of preventing overpopulation. But the real result would be to check overpopulation by destroying the women through exhaustion and abortion. Schœpf-Merei knew, though, of a case of that kind, where a woman would have swelled the heart of that

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style of Malthusian with joy and satisfaction. Her twenty-two pregnancies resulted in the existence of one child.

Some time ago Robertson remarked that one-half of the nursing working-women of Manchester, Eng., conceived during lactation; and but a few years ago L. Mayer collected facts concerning the frequency of menstruation during that period. He tabulates 1,285 cases in 395 individuals. Of 1,285 there were 685 who nursed. Of these 685 there were 402 who menstruated after some time. The first menstruation appeared after six weeks in 99 (25 per cent.), after twelve weeks in 46, after four months in 41, of the above number.² Menstruation, in his observations, had no injurious influence upon the health of the nurslings. Therefore, the reappearance of menstruation is no indication for either weaning the baby or changing the wet-nurse. There is but one such indication, viz., ill-health of the baby, brought on by the continuation of nursing. For the diminution of the quantity of blood in the maternal organism, or thorough change in its circulation, *may* result in either quantitative or qualitative alterations of breast-milk. In cases of doubt, the regular use of the scale may decide the question of nursing or weaning by determining the weight of the baby.

Coloring materials are known to enter into and pervade all sorts of tissues, even bones. Milk turns yellow by the eating of *caltha palustris*, saffron, and rhubarb, according to Mosler, red by rhubarb, *opuntia*, *rubia tinctorum*; blue by *myosotis palustris*, *polygonum*, *anchusa*, *equisetum*, according to Schauenstein and Späth. The blue color, which penetrates the milk uniformly, must not be mistaken for the superficial layer of discoloration of milk after a few days' keeping. The latter is of parasitic character (different though from the lactic acid parasite of Hessling), and

² Tilt obtained from his experience the following results: Of 100 women whose menstruation returned during lactation, 45 retained their milk unchanged both in quantity and quality. In eight the quantity diminished, one lost her milk altogether, 24 had a large flow during and 15 after menstruation. In five the percentage of solid constituents decreased.

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identical with *penicillium glaucum* and aniline blue. It extends into the lower layers, but gradually, infects, by communication, normal milk, and remains unchanged, though the milk be filtered through three-fold paper. When introduced, the milk thus parasitically infected is apt to give rise to acute gastritis and enteritis.

Ethereal oils are very apt to enter the milk. But to prove their presence otherwise than by taste or smell is not always easy. For organic chemistry has not even advanced sufficiently to decide whether the very same quinia, which, when given internally, communicates a bitter taste to the milk, is eliminated as quinia or in some other form (Chevallier and Henry). Nor can alcohol, opium, or morphia be discovered with absolute certainty. Still, the occurrence of poisoning through milk is an undoubted fact. An endemic is reported, in Italian and German journals, of an affection from which many people suffered, in the neighborhood of Rome, Italy. The symptoms consisted of vomiting, diarrhœa, intense thirst, and diminution of temperature and pulse. The milk of the goats was suspected; the goats were, however, declared to be in good health by the veterinary surgeon, and on analysis the milk was found free of an organic poison. Attention was then drawn to the food of the goats. On the pasture grounds there were found large quantities of *clematis vitalba*, *conium maculatum*, *colchicum autumnale*, *plumbago Europæa*. Again, the milk, and the masses brought up by vomiting, were examined and found to contain colchicine. An infant, two days old, died soon after taking the mother's breast for the first time. The coroner of Manchester, Eng., investigated the case, and elicited the fact that the mother was an habitual opium-eater, the amount of the poison swallowed weekly being about an ounce. * Dr. Fletcher's testimony went to show that the symptoms with which the infant died were the effects of opium.³

Anorganic chemistry has succeeded in analyzing with better results, a number of substances having been found in the secretion of the mammæ. As far as human milk is

³ Med. Press and Cir., 1878.

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concerned, these results are, however, mostly obtained by induction or clinical observations, for very few attempts at a direct chemical examination have been made. Large quantities of milk are required for examination, as a rule; and therefore, goats, sometimes cows, have been used for experiments. Iron is contained in milk, normally; in the ashes of human milk, according to Wilderstein, phosphate of iron 0.21 per cent., somewhat less than in the milk of pigs and cows. It was not, however, found by Harnier and Simon. Other experimenters—Lewald, Marchand, Chevallier and Henry, Rombeau and Roseleur—found soluble salts of iron, when given internally, within a short time in the milk; but they soon disappeared. Bistrow noticed a rapid improvement in the general condition of infants, when the wet-nurses took iron; this, however, is no direct proof by itself, for the mammary elimination of iron, inasmuch as the general improvement of the health of the wet-nurse would explain a better composition of her milk and the thriving of the nursling. Wilderstein's experiments with iron on goat's milk had the result of diminishing the quantity of the milk, but its specific gravity increased and the ashes contained twice the normal amount of iron. The effect was not observed before twenty-four hours had elapsed.

Bismuth was found in the milk by Lewald, Chevallier and Henry, and Marchand; by the first in small, by the second in greater quantities, by the last after a very short time.

Iodide of potassium was experimented with by Lewald. When fifteen grammes were given they proved present after four days. Then twenty-one more were given. The effect was kept up by that dose and did not disappear before seventy-two more hours had passed by. When, after that, iodide of potassium was given, the milk exhibited iodine after four days, and so remained for eleven days. Supported by such facts as these, Levisseur (*Jahrb. f. Kinderheilk. N. F.*, VI. 3, 1873) recommends to treat the wet-nurse with iodide of potassium for syphilis, sulphate of quinia for intermittent neuroses, arsenic for cutaneous secretions in the infant.

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Arsenic was found in the milk after seventeen hours. It persisted in passing through the mamma sixty hours.⁴

Lead and oxide of zinc, probably all other preparations of zinc, pass into the milk. A single dose of one gramme was found in from four to eighteen hours; it disappeared in from fifty to sixty.

Antimony passes into the mamma very easily, and requires caution.

Mercury was not found in the milk by Peligot, Chevalier, Henry, and Harnier. Lewald and Personne proved its presence. O. Kahler examined, by Schnieder's electrolytico-chemical method, the milk of three women under treatment with mercurial embrocations, but found no mercury. Thus, the treatment of infants affected with hereditary syphilis through the milk of their wet-nurse is not yet proved rational. My own clinical observations do not recommend the plan at all. The internal administration of mercurials, when persisted in sufficiently, yields very satisfactory results in the usual form of hereditary syphilis, which exhibits its first symptoms between the fifth and ninth weeks. Even the formidable species of syphilis attended with pemphigus in the new-born, may be controlled by subcutaneous injections of the bichloride—care being taken that the solution administered is weaker than that recommended by Lewin.

Carbonate and bicarbonate of potassa, and the sulphates of soda and magnesia pass out through the milk. The vegetable acids of alkaline salts reappear as carbonic acid. Sulphides of alkalies have not been found by Marchand.

Thus, there is any number of opinions and results of researches. Is it that chemistry is so uncertain in its methods of examination, or the reputation of the men who vouch for their results with their names so little reliable, or is the material on which the experiments were made unequal in its composition, or perhaps not quite well known in its physiological constituents?

We shall see that the fault lies very probably in the material on which experimenters tried their skill.

⁴ Hertwig asserts that arsenic given a cow for medical purposes in medicinal doses may poison her meat.

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The nature of the albuminates of the milk is by no means settled. Hoppe believes he proved the existence in the milk of an albuminous substance identical with the albumen of the blood serum. There is, according to him, but one difference between casein and the albuminate, viz.: that the former when treated with caustic potassa, yields sulphide of potassium, a change which does not take place in the latter. The albuminate undergoes its transformation into casein by a fermenting process, produced by lactic acid according to Zahn, by a hypothetical ferment according to Kemmerich.

Thus seemingly simple questions cannot yet be answered with absolute certainty. It cannot yet be stated that, or that not, the albumen of the serum of the blood is found in the milk. Still, the conditions of things vary. The walls of the blood-vessels of the mamma are thinner or thicker, more or less permeable, and vaso-motor influences will change circulation and nutrition. Thus there may be cases in which blood serum is simply added—as a transudation—to the secretion of the mammary gland. In other secretions, too, do we meet with considerable differences, many times without any surprise. By assuming that blood serum is found admixed to milk, we can much better explain the cases of infants influenced by medicines, infections, emotions acting through the milk, than when we look upon milk simply as the result of transformed glandular substance.

For such it is normally. The mammary gland is no filter, through which the serum of the blood, or the solutions of salts, or the transformed foods are rendered accessible to the hungry young. The quality and quantity of milk depends upon the development of the gland. Milk is not the product of the action of the cells; it is the transformed cells, the very organ. Thus the nursling is the veriest carnivorous animal. As long as the epithelium has not undergone a total change, the secretion is not milk, but colostrum, with its large globules. The character of the gland influences the milk, much more than food. The latter influences milk only by building up the gland, the cells of which receive materials of different kind; the principal

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of which is albumen. Where too large an amount of nitrogenous material is received, compared with carbon-hydrates, the proportion of albumen destroyed is too large, and the result may be that both the gland and the production of milk decrease. Therefore, the proportion of nitrogen in the food ought not to be disturbed beyond the increased necessity of the secretion. That means, as much as this amounts to the nursing woman requires, as either organic or circulating albumen. The circulation of albumen is particularly influenced by the use of water. Thus the favorable influence on the amount and character of the milk by all sorts of beverages, is best understood.

The character of the milk is beautifully illustrated by its chemical composition. Its ashes are tissue ashes, not that of plasma. It contains much potassa and phosphate of lime, but little choride of sodium.

The question whether medicinal agents will appear in the milk, is not, therefore, of sufficient accuracy, and cannot be answered either affirmatively or negatively, as long as the milk is not of a stable quality. Milk secreted from an insufficient mamma, by a woman not in full health and vigor, by an old woman, by a very young woman, by an anæmic woman, by a convalescent woman who has used up a large portion of her albumen both in circulation and in the tissues, by a woman soon after confinement, by a neurotic woman with frequent vaso-motor disturbances—milk, in fact, which is not exclusively composed of mammary epithelium, and contains admixtures, small or large, of transuded serum, is apt to be impregnated with elements circulating in the blood. The indications on the one hand for permission to nurse, on the other for the administration of medicines to a nursing woman, require, therefore, a greater strictness than is usually conceded, and will have to be modified, if the greatest good is to come from nursing, to the young infant. The good results obtained in many cases by artificial feeding, in preference to nursing, are therefore more than accidental.

The milk, then, is a secretion from the cells, not a transudation from the blood.

The difficulty of influencing the mammary secretion is,

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however; not equally great under all circumstances. In the first period of lactation, the glandular transformation is not yet accomplished. The secretion is of a different nature. It requires days to exhibit casein. Until then, the protein shows the nature of albumen. At the same time, the percentage of butter and salts is very high indeed; both of which explain the laxative character of colostrum. No less do macroscopic and microscopic observation convey the impression of its not being completed. It is yellowish, thickish, the fat globules are large, unequal, sticky and mixed with epithelium almost unchanged. There is less potassa and more soda than in normal milk, approximating it to the chemical character of plasma. Besides, colostrum of the cow has not infrequently been found to contain blood, and to coagulate when being boiled. Thus, colostrum⁵ is more like a transudation than a glandular secretion.

	4 weeks before part.	9 days before part.	1 day after part.	2 days after part.
Water	945.24	858.55	842.90	867.88
Solids	54.76	141.45	157.10	132.12
Albumen	29.81	80.73	—	—
Casein	—	—	—	21.82
Butter	7.07	23.47	—	48.63
Milk-sugar	17.27	36.37	—	60.99
Salts	4.41	5.45	5.12	3.10

As alluded to before, this colostrum is frequently found with disturbances of the general health, in anæmia, fevers, pregnancy, or advanced age of mother or nurse. It must result in disturbing the health of the nursling, and requires the very greatest attention, inasmuch as transudation may be mixed, at almost any time and in almost any proportions, with the normal mammary secretion.

This, then, has no normal standard, neither chemically nor physiologically. That a mere transudation should contain all sorts of material circulating in the blood plasma, is evident. Therefore, colostrum is apt to transfer to the nursling the liquid constituents of the mother's blood, no

⁵ Clemm's "Analysis of Colostrum."

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matter whether normal or abnormal, beneficial or injurious, organic or anorganic. The reports of infants harmed by the mother's opiate, influenced by her taking mercury, belong, therefore, mostly to the earliest period of lactation. The more normal the mammary secretion, the less danger in this respect. But very few persons are ever in undisturbed health.

Another point is still worthy of a remark. Chemical investigations have been made almost exclusively on the breast-milk of animals. Their results are very various indeed, and still this material is so much more stable than the milk of woman. In her wealth or poverty, idleness or work, rest or worry, emotions and thoughts, are a great many causes of changes and differences, not easily met with in the animal, depending upon influences bearing upon either vaso-motor action or material alterations in the circulating blood itself.

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ERGOT IN CHRONIC MALARIA

THESE notes are written exclusively for clinical purposes. That is why a few words on the active principles of ergot may suffice. They are sphacelinic acid, cornutin, also trimethylamin, vernin, and ergotinic acid. Trimethylamin gives rise to cerebral spasms which may become tetanic. It increases reflex irritability, and according to Gaethgens, accelerates, by irritation of centers located in the medulla oblongata, respiration and blood-pressure. Vernin, which was found by Schulze and Bosshard, is a new xanthin substance with effects similar to those described above. Sphacelinic acid (spasmo-toxin, sphacelotoxin) so called by Kobert who first studied and named it, when absorbed in the intestines causes a hyaline degeneration of the blood-vessel walls, which first contract and finally dilate, also coagulation inside the vessels with consecutive gangrene. In proportion to the doses taken it causes paresthesia, alopecia, falling out of the nails, and gangrene of the skin or of the extremities. Fortunately, it is easily decomposed, so speedily indeed that ergot a year old contains none at all. The effective principle is cornutin, found and named by Kobert. What Tarnet called ergotinin is chemically identical with it, but does not equal it in efficiency when prepared according to Kobert. It is easily decomposed when exposed to light or air. There is but little of it in ergot, all the alkaloids forming but 0.2 per cent. of the drug. It irritates the medulla oblongata, contracts arteries, increases blood-pressure, and contracts the unstriated muscular fiber in general. It is employed as a citrate or a chlorid. Kobert speaks of it as enclosed in capillaries holding 0.005 for subcutaneous use, or in pills of 0.002. In Merck's index, "cornutin" and "cornutin citrate" are enumerated. In poisonous doses it causes convulsions and contractures, also toxic polyneuritis, such as follows overdoses of arsenic, lead, phos-

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phorus, alcohol, or mercury. Ergotinic acid, called sclerotinic acid in its impurer state, lowers the blood-pressure in animals. Before knowing better, I recommended it even in my "Therapeutics" for subcutaneous injections to obtain the effect of ergot; that was a serious mistake. In the intestinal tract it is decomposed, and under the skin it is painful and irritating.

All of these constituents lose their power while in the ergot, from month to month. It should be gathered before the rye is perfectly ripe for harvesting, but generally is not. The decomposition of the grain is mainly due to its large percentage (39) of fat; that is why a salutary effect is often missed and the opinions in regard to the efficiency of the drug differ. The effect of the extract or fluid extract depends on the retention of the cornutin. All such preparations as are deprived of the substances soluble in alcohol, are deteriorated thereby, for it is the active alkaloids that are soluble in alcohol. In the fluid extracts the alcohol should be strong enough to hold the alkaloids and dilute enough to dissolve but little of the fat. As far as I am concerned, I have employed for internal use, whenever possible, the solid alcoholic extract of the pharmacopœia. It seemed to me to give better results than even Bonjean's ergotin, which has been in the market since 1842. At all events, the value of ergot preparations is in their undecomposed alkaloids; everything else is either indifferent, disturbing, or injurious.¹

The effect of ergot and its preparations, when given in medicinal doses, is mainly spent on the unstriped muscular fibers. Its effect on the uterus has been known and used and abused a long time. The muscles of the vagina were to found to be influenced by it by Swiecichi.² That is why I felt encouraged more than forty years ago to administer it in conditions of hyperemia and of the acute and subacute inflammation of such organs whose blood-vessels are not entirely or almost deprived of muscular

¹ Kobert, "Lehrb. d. Pharmako-Therapie," Stuttgart, 1897, p. 502.

² Quoted by Kobert, "Intoxicationen," p. 185, 1893.

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layers. The media of small arteries has unstriped muscular fibers. There are several of these layers in the larger ones, which besides are supplied with elastic fibers. This structure is uniform in all the arteries of the body. The veins, however, exhibit more startling differences, nowhere more than in the tunica media. It consists of circular muscular fibers, elastic network and fibrillar connective tissue, is best developed in the v. poplitea and the other veins of the lower extremities, less in those of the upper extremities, still less in those of the abdominal cavity. It is *absent*—and here is an important point—*from the veins of the pia and dura mater*, of the retina and the bones, the vena cava, and all the veins emanating from the capillaries, where the media consists of transverse and oblique bundles of connective tissue only.³

As I said, the veins of the pia and dura have no muscular fiber in the media; moreover, in the cranial cavity they are long and distant from their arterial pressure supply. That is why I am never surprised when the employment of ergot in brain disease is wholly futile. Circumstances are different in connection with the spinal canal. The veins of the cord and its membranes are no better supplied with contractile elements than those of the cranial cavity; but because of their shortness they are under the immediate influence of blood-pressure. That is why ergot, so useless in brain disease, is perfectly adapted to cases of spinal hyperemia, or to acute, or subacute spinal inflammation.⁴

³ Ph. Stoehr "Histology," seventh edition, p. 91.

⁴ In hemorrhages, such as those of the lungs, ergot has long been used by some with great confidence, by others with indifferent success. Among the latest preparations is ergotinol, of which 1 c. c. corresponds to a gram of extract of ergot, which Vosswinkel eulogizes highly in pulmonary hemorrhages when used subcutaneously. Some think highly of ergot in all sorts of inflammatory processes. There is Croq of Brussels, for instance, who employs it in tuberculosis. In his opinion the tendency of tuberculosis is rather that of getting well, unless complicated by inflammatory processes to counteract which no medication seems to be more indicated than that of ergot. Certain forms of spermatorrhea and nocturnal enuresis connected with

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The practice of employing ergot in spinal cases was gradually developed. In a report published in the *New York Medical Monthly*, during the years 1860 and 1861, on my clinic of the diseases of children in the New York Medical College, then in existence, you may find a few of my earlier cases in which I employed ergot for the purpose of contracting blood-vessels and relieving hyperemia and inflammation in spinal diseases.

Number 68 is a case of acute poliomyelitis; number 122, one of spinal meningitis; number 167, one of spinal hyperemia. So far as I know they are the first I published after some years of experience with the drug. In regard to the latter disease my information was obtained from a friend who at that time was stationed at the Emigrant Hospital of Ward's Island, Dr. Francis Simrock. Some histological considerations encouraged me besides in employing it in this way. The capsule of the spleen consists of dense and hard connective tissue, unstriped muscular fiber, and an elastic network. It sends off numerous processes, leaf- and string-like layers, into the interior of the spleen, thus forming a coherent network which contains the pulp. This network also contains, besides connective tissue, copious unstriped muscular fibers. Thus it seems there is no organ in the animal economy more amenable to the action of a muscle-contracting agent.

muscular incompetency of the sphincter are frequently benefited. Here its effect may be the direct one on the unstriped fiber, or on the spinal center of the sphincters which must be taken to be present in the lumbar cord along the uterine and spermatic centers. It has been given in Graves' disease for the same reason, not to speak of, for reasons unintelligible to me, its use in non-pancreatic diabetes mellitus, sea-sickness, and whooping-cough. In the paralytic form of hemiplegia it has been highly recommended, and may be all of us have employed it. In tabes, spastic spinal paralysis, in progressive bulbar paralysis, it has been used because of the supposition that the anatomical lesion is attended by dilatation of blood-vessels. The results are but few or none. At all events, no physiological effect can be expected except in the initial stages when there still is or may be spinal congestion.

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The employment of ergot in moderate doses has no dangers under most ordinary circumstances. I have used it these forty years extensively, for weeks and even months in succession, without a single case of intoxication. The latter has frequently been observed in all countries of Europe, mostly in the past. If we hear of epidemics or endemics of ergotism, there are but few countries in which they are often met with, *viz.*, Spain, and, still more, Russia.

With the increase of civilized agriculture and a slight improvement in the general condition and nutrition of the population the average of good rye increases, that of ergot decreases. In every harvest of corn there is some ergot; one per cent. is common and not attended with danger. But when a population is starved and subjected to malaria and other infectious diseases, and unclean and sleepless from hard work, starvation, and anxiety, and when they are fed on rye with a large percentage of ergot, and particularly when it is of recent growth, during and a very few months after cutting, ergotism may make its appearance.

There is danger of poisoning only, not in medication. In connection with malaria there are two organs we have to consider when medicating, the blood and the spleen, the former because it contains the sporozoa, the latter because of its sponge-like mass in which it harbors the infected blood and serves as a receptacle of dangers. It appears that a direct effect on the blood or on the plasmodia is not required for a cure, but that gradually the restoration of the spleen to a fairly normal size, forcing the stagnating blood into a normal circulation with progressive elimination of the plasmodia is sufficient to open the gates to recovery. That is what I believe I have often done by giving ergot in malaria.

The uncertainty of the effect may also be due to the fact that most preparations of ergot contain both ergotinic acid, which lowers arterial pressure, and cornutin, which contracts the arteries. All of this should impress us with the necessity of using the alkaloid cornutin when it is obtainable. Even this substance should be used with

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great care, for instance, in hemorrhage, which may be increased by heightened blood-pressure.

CASE I.—A Hungarian boy, aged five years, just arrived in the country, October 10, 1859. Had fever and ague, mostly quotidian attacks, at his home. On the ocean he was better, *viz.*, now and then he had a day without an attack. He was pale, waxy, with extensive hemic murmurs and with albumin in the copious and watery urine. His spleen extended nearly to the spina anterior superior. Had regular daily attacks with great prostration, in spite of quinin and Fowler's solution. Of the former he took from 6 to 12 grains daily. Being previously constipated his bowels had been attended to. Not being acquainted with the fluid extract—perhaps it was not even in the market⁵—I gave him an infuso-decoction, prepared with sulphuric acid, of half an ounce of ergot in 10 ounces of water, of which he was to take one-half tablespoonful three times a day. There being no improvement he took, after four days, the same dose five times a day. When I saw him ten days later he had been without an attack three days. The doses were continued five days, then for five more days four daily doses were given, and thereafter but three. During all this time he had no attacks of fever, albumin became less, but his spleen was still as large as before under percussion and palpation. Finally he was removed from South Brooklyn where Gowanus Bay was as pestiferous at that time as the shores of the River Theiss, and gradually with the use of iodid of potassium, iodid of iron, and the occasional resumption of ergot, he improved. After a year I saw him again, looking well but pale, with no albuminuria, hardly any murmur, but his spleen still palpable 3 centimeters below the border of the ribs.

CASE II.—His brother, sixteen years old, gave me a new experience. He had the very same symptoms ex-

⁵ Dr. E. R. Squibb, in a letter dated September 21st, has kindly informed me that it was first prepared by Professor Wm. Procter, Jr., of Philadelphia in 1857 ("Proc. Amer. Pharm. Asso. for 1857," p. 130, and 1859, p. 271), and by himself since 1859.

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hibited by his brother—hydremia, tumor of the spleen, etc., without albuminuria and without the history of chills. For the latter reason he had taken no medicine whatsoever. After purging him gently I ordered the same medicine to be taken in tablespoon doses four times daily. Two days after beginning his treatment he had a very violent chill, followed by perspiration; no temperature was taken, as he was miles away. He had another violent attack he next day, a milder one a few days after this, and then no more. He was treated like his brother, with the same slow but finally satisfactory result.

CASE III.—A. W., male fourteen months old. Was seen by me October 1, 1880. Was breastfed until half a year previously, then fed on mixed food. Had diarrhea in the summer, and fell ill with pneumonia of the right side a fortnight before I saw him. This was watched carefully; I found but few remnants of it. But in the beginning of the second week the baby was taken with a convulsion, high fever and vomiting, lips and fingers were bluish. After a few hours the condition improved, but on the following day, blue nails, high temperature, followed by apyrexia, and great debility were noticed. No return of pneumonia; no nephritis. Quinin was given in repeated doses for several days. No convulsion returned, but there were temperatures up to 102° and as low as 97° F. every day. The urine was pale all the time; more was passed during the high temperature, none during apyrexia. On October 1st this condition, of somewhat elevated temperature every day, which lasted a few hours, continued in spite of from 30 to 40 eg. of sulphate of quinin. There was no apparent reason for changing the medication, but care was taken to give the quinin doses during apyrexia and not within the last three hours before the expected attack. Up to October 5th there was hardly any change in the daily recurrence of temperature. The spleen became palpable and appeared sensitive on pressure; meanwhile no anomaly of heart, lungs, or kidneys. Quinin was then stopped, and fluid extract of ergot given in six, after five days, in five, after ten days, in four, daily doses of 10 minims each. On and after

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October 7th, no attack of fever; on the 10th the spleen could no longer be felt. Ergot was continued to November 15th, and Fowler's solution and syrup of the iodid of iron were given from October 15th to the end of the year.

CASE IV.—Mrs. M., thirty-one years old. In moderate health until the summer of 1890, though she lived in East 117th street, New York, a hot-bed of malaria even at the present time, until August when she moved to Brooklyn. The only exception to her average health consisted in neuralgic pains of uncertain duration, and at irregular intervals. Left hemicrania she had had for years, neuralgia of the left upper extremity during the summer; and for several weeks before she presented herself on November 24, 1890, neuralgia of the right lower extremity, posteriorly. This pain grew worse from slight pressure; deep pressure would diminish it. She had an extensive and loud systolic, a mild diastolic murmur, no enlargement of the heart, pale lips and conjunctivæ, and a small pulse of eighty. She had suffered from chills and fever since September; the tertian type had changed into the quotidian after a week; later she had two attacks a day. They would intermit now and then after heavy doses of medicine. During the previous fortnight she had taken 400 grains of quinin, and had almost daily attacks; she had a chill with a temperature of 104.4° F. in my office. Her spleen was 15 cm. long, 8 cm. wide, and sensitive over such of its surface as could be palpated. She was ordered to go to bed for at least a week, and to take 0.5 of calomel; at the same time a teaspoonful of Squibb's fluid extract of ergot four times a day in whiskey and water. When after three days her chills continued, the dose was given six times a day, and no chill occurred after the fifth day until she presented herself on December 3d, nine days after her first call. Her spleen was 3 cm. shorter and less sensitive. She then was ordered 0.75 of sulphate of quinin once every fifth day in the forenoon, and the ergot was continued in the same doses. On December 7th she had a slight chill while still in bed in the morning. On December 10th, the ergot was reduced to 15 c.cm. a day, in four doses; on the 20th to 10 c.cm. On

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that day her spleen could still be felt slightly below the ribs. The quinin was continued to about the middle of January, the ergot another month afterward. At the same time, from December 20th to the end of January, she was given iodid of potassium, 5 grams, three times a day.

CASE V.—M. H., twenty-six years old. Was admitted November 11, 1897, and discharged December 6th. Was a moderate drinker and not venereal. Had no previous sickness. After a two-weeks' sojourn in the South in September he had one morning a chill which lasted one-half hour, and was followed by perspiration. Such attacks he had every other day or two, then every day for three weeks. Quinin was taken and the type of his fever became tertian again. Lately, while he was still taking quinin,—mostly, he said, when the chill came on and enough to affect his hearing,—the type of his fever became mixed, sometimes every day, sometimes every other day, with a few intervals of some days. On the 11th of November his temperature was 100.4° F. at noon; a chill came on at 2 p. m., with a temperature of 103.2° and 104.4° F., which sank gradually. His spleen was quite tender on pressure below the ribs, and up in the seventh intercostal space, and was about 13 to 14 cm. long, as revealed by percussion. Plasmodia were found in large numbers. Squibb's fluid extract was given in four daily doses of a teaspoonful (4 c.cm.) each. The highest rectal temperature of November 12th was 100.8° F. at 2 p. m., of the 13th, 99.4° F., of the 15th, 99.2° F., 16th, 99.8° F. No chills. Did not feel quite well on the 20th, and was given a few teaspoonfuls of sodium sulphate. Highest temperature 99.6° F. at 8 p. m. Because of indigestion, with coated tongue, took sulphate of magnesium on the 21st. Temperature 101.2° F., but no chills. Spleen smaller, less sensitive, plasmodia still found occasionally. Highest temperature on the 22nd, 101.8° F., on the 23rd, 102.2° F., on the 24th, 101.8° F., on the 25th, 100° F., on the 26th, 99.8° F. During all these days he never had abnormal temperatures like those he exhibited while under the uncontrolled influence of his malaria; but normal they were not. Evi-

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dently the rise extending over days was due to an additional, probably, gastric influence. About this time plasmodia disappeared from his blood. He remained under observation more than a week, and was then discharged.

CASE VI.—T. B., twenty-eight years old. Admitted May 10th. Had had syphilis nine years before, gonorrhea several times; was otherwise healthy with the exception of slight colds; drank "some." His feet had been swollen a little for seven months. During the previous three months had had chills and sweats, off and on, he said. Took a great deal of quinin, almost daily, which helped him. Temperature on admission 101.4° F., pulse 118, respiration 28; pallor, anemia. Sibilant and sonorous breathing over both lungs, anteriorly, breathing diminished over base of left lung posteriorly, with subcrepitant râles and dulness. Liver flatness from sixth rib downward to below the costal border; the organ was felt nine centimeters below it in the parasternal line. Spleen extended from the seventh rib in the axillary line to the crest of the ilium and to within $2\frac{1}{2}$ centimeters of the median line. No edema, no ascites; kidneys negative; axillary lymph bodies slightly enlarged. Plasmodia found pigmented, flagellated, segmented. Fluid extract of ergot 4 c.cm. four times a day on and after the 12th of May, preceded by a dose of calomel and sodium bicarbonate on the 10th. May 15th: no chill since; diminution of size of spleen, which feels a little softer. May 23rd, was up and about all the week; no paroxysm, spleen softer, no flagellated and no segmented plasmodia. Had no paroxysm to the end of the month; at that time no plasmodia, and spleen was less tense and shorter by almost three centimeters.

These cases are selected almost at random from my records; a great many were never recorded, since my experience with the drug was no longer doubtful. In connection with the subject I may here state that my success with ergot in chronic and relapsing malaria encouraged me to try it in many cases of acute malarial infection. I am certain that many such cases will respond to the action of ergot, but in the average case less rapidly

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than to that of quinin. Indeed, these experiments were made for the sole purpose of observation.

CONCLUSIONS

1. There are cases of chronic intermittent fevers with large tumefaction of the spleen, that after having resisted the action of quinin, arsenic, methylene blue, eucalyptus, and piperin are benefited by ergot.

2. When enlargement of the spleen is not old and not firmly established the contracting effect of ergot is noticed within a reasonable time.

3. The attacks will disappear before the diminution in the size of the spleen is very marked.

4. Though temperatures, after the employment of ergot, remain irregular and now and then somewhat elevated, chills, as a rule, are not noticed with this elevation.

5. Plasmodia do not seem to disappear from the blood so rapidly as they do after quinin, when the latter is effective. But even while some are still present, the attacks being more or less under control, the patient will feel better.

6. Complicating local pain requires additional treatment with ice, or cold douches, or heat; chronic hyperplasia demands iodid of potassium or iodid of iron. Digestive disorders may indicate, as they often do, when quinin is expected to act, before the employment of ergot, an emetic, or a purgative or stomachics.

7. An experience extending over forty years in which I have used ergot in many instances, justifies me in asserting at least this much: that there are many cases of chronic malaria, apparently intractable, that will get well with ergot.

8. There are cases, occasionally, in which the return of elevations of temperature after the successful use of ergot makes the combination of ergot and quinin, or ergot and arsenic advisable, though quinin and arsenic had not been successful previously.

9. Ergot, like quinin, probably by its sudden contracting effect on the spleen, and by the forcing of large quantities of plasmodia-laden blood into the circulation, is,

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in chronic malaria when hydremia and spleen tumor are excessive, capable of bringing on the very first attack of chills and fever.

10. Recent cases of malaria have got better, or were improved under the extensive use of ergot, but many resisted a long time; that is why acute cases should rather be treated with quinin.

REMARKS ON STRYCHNINE

ON the fifteen pages of close print given by H. C. Wood¹ to the discussion of strychnine there are only some brief sentences referring to the subject on which I intend to make a very few remarks.

On page 212 he says: "The full dose of strychnine produces a rise of the arterial pressure which is enormously increased during the convulsion, after which there is a very pronounced fall in the arterial pressure." Page 213: "Our knowledge of the cardiac action of strychnine is still imperfect. Although Lahousse believes that in any dose strychnine depresses the intracardiac ganglia, it is probable that the small dose has a stimulating influence upon the heart." "In regard to the action of the alkaloid upon the vagi there is much difference of statement by investigators." Page 214: "The fullest permissible doses stimulate very powerfully the respiratory centres, and also slightly increase blood-pressure by stimulation of the vasomotor centres, and probably also of the heart itself." Page 217: "Strychnine is an extremely serviceable remedy in the treatment of cardiac diseases with weakness of muscle. In mitral insufficiency we have seen it prolong life for years after the failure of digitalis, and when before its administration immediate death seemed inevitable. It should always be tried in cases of failing heart where digitalis disagrees, it not being possible at present to pick out those cases in which brilliant results are to be achieved by it. To be effective it must be given in rapidly ascending doses, the patient being kept, if necessary, for weeks and months on the verge of strychnine poisoning, with distinctly heightened reflexes and some muscular stiffness. Clinical experience shows that it has no cumulative action, but that the patient becomes accustomed to its use,

¹ "Therapeutics: Its Principles and Practice," eleventh edition, 1900.

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so that a grain a day may finally be given without any serious effects."

The German literature does not favor strychnine. The latest text-books of Tappeiner (1899), of Penzoldt (1900), the great cyclopædia of Liebreich (1894), and the pharmacotherapeutics of Kobert (1897) contain but very few remarks. We learn that strychnine retards the pulse and increases blood-pressure by stimulating the centres of the vagus and the vasomotors, but that it has no prominent therapeutic effect except occasionally in partial peripheral paralysis, in the psychical and nervous disorders of chronic alcoholism, in incontinence of the bladder, in amblyopia and amaurosis unattended with serious anatomical disorders, and in poisoning with chloroform or morphine. We are also told that a cumulative effect has sometimes been observed after many days, that poisoning has occurred from medicinal doses injected in diphtheritic paralysis or administered during cardiac diseases, that now and then the secretion of urine is impeded, and that occasionally unexpected poisoning has taken place.

In the *Aerztl. sachverständ. Zeit.* of August 1, 1900, for instance, Otto Jonas reported the case of a child of two and a quarter years that took two tablespoonfuls of a proprietary syrup of the hypophosphites which was advertised to contain some strychnine (0.001 in one teaspoonful) with poisonous effect.

In a similar manner the French literature disposes of strychnine and its cardiac effects with few words. Even G. M. Debove and Ch. Achard² have but little to say on the subject of strychnine in cardiac diseases. In their opinion it is observed to be a general and therefore a cardiac nerve tonic, and to influence the myocardium particularly. It diminishes blood-pressure and retards the action of the heart; even in small doses (Lahousse) it paralyzes the intracardiac motory centres, and in large doses, the terminal fibres of the pneumogastric. It is recommended in three daily doses of a half or of one milligramme for valvular lesions in the period of compensation. Huchard combines it with sparteine.

² Manuel de thérap. méd., 1900, vol. i. p. 444.

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The English literature—for instance, I. Mitchell Bruce's "Principles of Treatment," 1899—treats the results of strychnine medication with more appreciation.

The daily practice of American physicians with whom I come in contact and whose cases I read gives no scanty recognition to strychnine in all sorts of diseases. I seldom meet a case of cardiac disorder or of anæmia or of debility, no matter how caused, whether localized or general, or of collapse, in which strychnine has not been given long and extensively. Indeed, while formerly it was almost impossible to find such a case that was not attended by the use of digitalis, strychnine is now considered the sheet-anchor. Such a dictum as that quoted from Wood, where he says that strychnine kept alive where digitalis had no effect, is quite capable of imbuing the profession with the belief in the identity of the two drugs. There is, however, no such identity.

When therapeutic measures are selected for diseases of the heart, we should not overlook the complex nature of the anatomy, the physiology, and the pathology of the organ. The muscle, the pericardium and endocardium, the blood-vessels, or the innervation may be faulty. Part of the latter is controlled by centres located in the muscular substance. They are Bidder's and Remak's ganglia connected by nervous plexuses. They are mostly found in the septæ of the atria and in the boundary between them and the ventricles.

Until a short time ago all the cardiac ganglia were believed to be motory organs. In a discussion some years ago before the Association of American Physicians that opinion was upheld, and appeared to be sustained by a paper published in Virchow's *Archiv*, vol. lxxiv., written by Putjatin in 1878. But, according to the researches of His and Romberg,³ it seems to be proved that the ganglia come from the sympathetic plexus. Now the sympathetic ganglia were demonstrated by O'nodi⁴ to be derived from the spinal ganglia, which are exclusively sensitive. That is why the sympathetic and the cardiac ganglia should be

³ Arbeiten ausd. med. Klinik zu Leipzig.

⁴ Arch. f. mikrosk. Anat., 1886, vol. xxii.

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sensitive only,⁵ provided O'nodi's results are confirmed, which is demanded by the bewildering complexity of the anatomy and physiology of the sympathetic nerve in general.

Coördinate in importance with the ganglia, if they be motory at all, the pneumogastric nerve and branches of the sympathetic control the action of the heart. The cardiac branches of the former have mainly an inhibitory action, but contain accelerating fibres also; one of the upper cardiac branches is a depressor which diminishes the tone of the blood-vessels and arterial blood-pressure; its pericardial branches carry sensitive fibres. The sympathetic nerve is known to be sensitive, secretory, motory, vasomotory, vasodilatory, inhibitory, accelerating, and trophic. It sends accelerating branches from its cervical portion directly to the heart. There are many communicating branches between this and the cerebrospinal nerves. In this way the blood-vessels, the muscular layers of which are thus completely controlled, are influenced in the most various ways, which are seldom entirely understood in an individual case. But there is one fact that is easily appreciated,—viz., that in most cases it is utterly impossible to be quite certain of the correctness of our remedial indications in the diseases of an organ with such an inordinately complex innervation. Nor are these difficulties diminished or obviated by the heart muscle, for it is rarely diseased without some endocardial or pericardial complication. The results of modern research tempt us often—indeed, should tempt us—to make the diagnosis of our forefathers, “carditis,” more frequently than that of an isolated myocarditis, endocarditis, or pericarditis.

Besides, the anatomical alterations of the myocardium vary considerably, both as to their etiology, nature, and seat. In regard to the latter it should not be overlooked that the lesions of no disease are universal in the tissues of a whole organ. A pneumonia is local, a nephritis need not change all of the renal substance, an encephalitis is local. So a myocarditis is not, or need not be, universal;

⁵ A. Hoffman, *Pathologie und Therapie der Herzneurosen*, 1901, p. 14.

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it is mostly focal; indeed, parts of the myocardium may be healthy while others are diseased. That is why a drug that acts well on the healthy part of the muscle may not affect the abnormal portion, and *vice versa*; and why the results of our medication may leave—do leave—much to be desired.

The character of myocardial changes may be inflammatory or merely degenerative. Inflammation may be acute or chronic, general or interstitial. The latter is mostly chronic, and frequently toxic. The degeneration of the muscular tissue of the heart may consist of mere parenchymatous turbidity or of granular degeneration, or may amount to segmentation and fragmentation,⁶ which may have different causes, from very strong and irregular contractions to (more frequently) extensive acute or chronic, primary or secondary textural changes, with results depending on the extent of the lesion.

Of the greatest importance to the practitioner is the causation of myocardial anomalies, which are usually chronic. Congenital smallness of the heart may lead to lipomatosis without secondary dilatation; that is what I saw in a case of pernicious anæmia which proved fatal to a woman of thirty-four years. Insufficient nutrition with secondary anæmia injures mainly the muscular structure, more than the interstitial connective fibres. Chronic disturbances of the circulation, such as sclerosis of the coronary, universal atheromatosis, or chronic nephritis, disturb the nutrition of the heart by affecting its nutrient vessels. So does the obliteration of the pericardial cavity. Diseases of the respiratory organs, inflammatory or (as in whooping-cough) merely congestive, have a similar effect by interfering with general and local circulation. Lack of exercise,—for instance, in overtasked school-children and persons of sedentary habits,—though not so suddenly as overexertion, injures nutrition. Chronic changes of nutrition,—*e.g.*, the scrofulous tendency,—and adiposity from whatever cause, have a similar effect. A certain number of myocardial alterations depend on nervous influences which either act directly on the cardiac innervation or influence

⁶ Hektoen, *Amer. Jour. of the Med. Sci.*, Nov., 1897.

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the structure of the heart muscle by their effect on the cardiac circulation and nutrition.

The depressing effect of emotions causes distention, dilatation, or hypertrophy, by preventing the completion of systolic discharges, differently from what takes place during athletic sports. It is in these latter, particularly when the heart was not healthy previously, that temporary distention may become permanent. Indeed, fatigue alone renders the muscles more flaccid.

But many more structural changes of the myocardium are due to intoxications and infections. Alcohol, tobacco, syphilis, tuberculosis, and malaria have long been known in that connection. The dangers of the acute and chronic myocardial changes that follow infectious diseases have been studied these twenty years or less, since it became manifest that high temperatures alone were credited with more injurious consequences than they deserved. Typhoid fever, scarlatina, influenza, and diphtheria, particularly the latter, occupy the front rank as injurious influences. When their symptoms—principally arrhythmia and extensive (mostly systolic) murmurs, with (or without) accentuation of the second pulmonary sound—disappear within a few weeks, the prognosis as to complete recovery is good; it becomes doubtful when they remain a few months, and bad if after a year (good care being taken of the general health) the last symptoms are still persisting. The sudden deaths from heart-failure, mainly during and after diphtheria, find their ready explanation partly in the muscular alteration, partly in the structural changes in the innervating fibres of their ganglionic centres.

I mentioned arrhythmia of the heart as a prominent symptom. It has been attributed to a vast number of causes, to remember which taxes the memory unduly unless we class them under two heads, the first of which is abnormal innervation (neuroses and psychical diseases, cerebral affections, reflexes, poisoning with digitalis, coffee, tea, or alcohol), the second, a disease of the myocardium. All sorts of valvular affections have also been charged with having the same effect of causing arrhythmia, but we should not forget that murmurs which are believed to be

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valvular are often myocardial, and that both stenoses and insufficiencies may depend on the condition of that small part of the myocardium in which the valves are inserted. Applications of ice, digitalis or strychnine internally, or in other cases an opiate, will frequently diminish or remove a murmur that was erroneously attributed to the lesion of a valve. Myocardial arrhythmia may be congenital; it is frequent in atheromatous and fatty degeneration, in acute or chronic inflammations, and in cases of pericardial adhesions. All the arrhythmias observed in typhoid, variola, and influenza should be explained by the parenchymatous changes brought about by the microbic or toxic infection. These parenchymatous and the acute and chronic inflammations of the heart muscle have a characteristic peculiarity, in this, that the lesions are not ubiquitous, or not equally disseminated. That is why the muscular contraction is not uniform, as, for instance, in the cases of fibroma of the heart muscle observed by Ebstein. The results may be irregularity or gallop rhythm, while in those cases in which the change is uniform, as in many forms of fatty degeneration, the result is either tachycardia or bradycardia.

Heidenhain and Knoll found also that arrhythmia is observed when the heart is overcrowded with blood and its force not commensurate with the resistance met with in the peripheral circulation. It is particularly in these cases, as in some of the conditions enumerated above, that cardiac stimulants, such as digitalis and strychnine, seem to find their proper indications. In such cases we have to deal either with an incompetency of the whole myocardium or with a local weakness or fatigue depending on a local, perhaps not diagnosticable, alteration. Still, such instances are very perplexing, for it is exactly in them that the cardiac stimulants fail to act or become positively injurious.

Ethel Z, aged ten years, was admitted to the "Jacobi Ward" of Roosevelt Hospital, February 21, 1901. She had diphtheria several years ago; other history negative. Three weeks before admission the child had an attack of pain in several joints, with fever; she was in bed two weeks, has been out of bed since, but with dyspnoea and some

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articular pains. Urine 1026, trace of albumin, a few granular casts, no blood, no renal epithelia. Examination of the lungs, liver, and spleen negative. Apex beat in fifth space, outside of nipple-line, cardiac dulness corresponding and extending one centimetre beyond the sternum about the second right rib. Systolic mitral murmur quite loud. Second aortic and pulmonary sounds accentuated. Second (mitral and tricuspid) sound about the level of apex reduplicated,—gallop rhythm. She took some salicylate of sodium, and February 26 was given one-fiftieth of a grain of strychnine three times a day.

February 28.—Urine negative, no casts. Gallop rhythm much more marked and radial pulse slightly irregular. Strychnine was discontinued and codeine, one-fourth of a grain four times a day, substituted.

March 4.—Systolic mitral murmur not changed, gallop rhythm less. It grew less from day to day till March 9, when codeine was omitted and replaced by strychnine.

March 10.—Gallop rhythm more marked. Its intensity grew until March 15, when strychnine was discontinued and codeine resumed. After a week the second sound was no longer double, and the child, after having been out of bed, was discharged April 15.

Teresa de T., nine years old, was admitted March 7, 1901, with chorea minor. Had chorea five years previously and never was quite free. Three months ago the twitching became worse. Urine negative, with the exception of a few pus-cells. Lungs negative. Faint, soft systolic murmur at apex. Pulse very irregular and intermittent. Second sound over mitral and tricuspid duplicated,—gallop rhythm. Appetite poor, but patient sleeps well and feels comfortable when in bed. Liquor potassii arsenitis, and, on account of deficient appetite and also the gallop rhythm, which was attributed to myocardial debility, strychnine nitrate, one-fiftieth of a grain three times a day, were ordered.

March 10.—While continually in bed heart was more irregular, gallop rhythm more marked. Strychnine stopped and codeine, one-fourth of a grain four times a day, substituted.

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March 14.—Pulse fairly regular, gallop rhythm much less.

March 18.—Pulse quite regular and gallop rhythm almost disappeared. Strychnine was resumed and codeine omitted.

March 20.—While the condition of the child was improved, the pulse became slightly irregular again and gallop rhythm returned. The experiment was discontinued, strychnine being omitted and codeine resumed. Gallop rhythm became less within three days and disappeared on March 31, when the patient was discharged.

In both these cases the temptation to regard the gallop rhythm as depending on general muscular weakness of the heart only was very great; if that diagnosis had been correct, strychnine would surely have been indicated. Failing utterly, it proved the incompleteness or the erroneousness of such diagnosis. Even if partly correct, the cases would prove the complex conditions of the cardiac lesions in many, perhaps most, instances. It would also prove that the modern maxim, "simplicity of prescription, only one drug at a time, no polypharmacy, rely on nature," has its unscientific and ridiculous side. Muscle, serous membrane, vagus, and sympathetic may be affected coincidently, or some of them at the same time. Rely on digitalis alone? Yes, if you be sure you want nothing but the stimulation of the pneumogastric. On strychnine alone? Very well, if you want a vasomotor stimulus. Alcohol? If you want to dilate blood-vessels in conditions of spastic anæmia, occasioned by fright, chill, or sepsis. Atropine? If you have to combat diminution in the number of cardiac contractions. Thus I might go on teaching the necessity of combining medicines in combined conditions.

Strychnine is eminently a vasomotor remedy which is indicated to correct defective distribution of the blood. It stimulates the centre of the pneumogastric nerve and thereby contracts all the blood-vessels under its control, mainly those of the heart and of the abdominal cavity. These latter depend on the action of the splanchnic nerve, section or paralysis of which results in dilatation of the numberless and dilatable vessels of all the viscera. The

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vast amount of blood thus stored in the abdominal cavity is withdrawn from the aorta, the pressure of which is lowered (even much more than in excessive aortic insufficiency), and from the brain. Pallor, collapse, and syncope are the results.

Strychnine, through its stimulating influence on the centre of the vagus, contracts the paralytic blood-vessels, and thus facilitates a new supply to the heart and brain.

The dose of a remedy required is by no means a stable one, for the amount of blood appears to influence the action of a drug in the living organism. Welker explains the resistance of fish to the action of curare by their smaller amount of blood, which has from one-fifty-third to one-ninety-third of their body weight, while the proportion in the dog is from one-twelfth to one-eighteenth, and in man from one-thirteenth to one-nineteenth, the latter being the ratio in the young, the former in the adult. It appears, therefore, that in fish the poison arrives at the periphery of the nerves more slowly than in the mammal. In accordance with this observation is that of Delaunay,⁷ who found that when a frog was poisoned by strychnine after a depletion, its action was less marked than in a frog not so depleted. Of two frogs that one which was better nourished was more sensitive to the action of a poison than that which was emaciated by starving, and the right half of the body, which in frogs is more developed than the left, was more sensitive—more readily poisoned—than the latter. It would consequently appear that, like young infants, ill fed, emaciated, slowly convalescent, or septic patients, or those in whom the nerves—for instance, in infectious fevers—have undergone organic deterioration, require larger doses of strychnine (also of other poisons, such as quinine, atropine, and nicotine) than the normal organism.

The new-born infant is but little sensitive to strychnine. The spastic effect is obtained by 0.415 of a milligramme of the nitrate in a kilogramme of the newly born animal, 0.347 milligramme is effective when two and a half days old, 0.218 milligramme when seven and a half days old,

⁷ Comptes-Rendus de l'Acad. des Sciences, vol. xliii. p. 452.

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and 0.210 milligramme when ten days old.⁸ This observation is fully in accordance with the fact (Soltmann) that reflex effects are but scantily obtained in the newly born animal.

Still, in older children unexpected effects of strychnine have been observed; accidents after its subcutaneous use in diphtheritic paralysis have been recorded. Hyperæmia of and hemorrhage into the nervous centres, mainly the brain, seem to cause a great sensibility towards strychnine. I should judge that it is due to the diminished or paralyzed inhibition, in the same way that patellar reflexes are exaggerated during cerebral diseases.

Some of the fatal terminations of strychnine treatment occurred in cardiac diseases; it is worth while to take notice of such facts as long as the prevalent habit of prescribing strychnine is apt to run into the thoughtlessness of routine.

Strychnine is claimed as a *vasomotor* stimulant. The centre of vasomotor influences is located near the inhibitory and also near the respiratory centres. The vasomotor centre regulates blood-pressure and influences the contractions of the heart. They become more frequent during an increase and more slow during a diminution of blood-pressure. It appears evident that whatever drug influences blood-pressure influences the heart. Blood-pressure, however, depends not on the heart alone, but also to a great extent on the peripheral circulation, which is almost wholly due to the action of voluntary and involuntary muscles. Their tone is influenced by their voluntary or involuntary action. Contractions of the voluntary muscles, brought about or strengthened by strychnine, for instance, or by massage or electricity, increase general blood-pressure by inciting arterial action and the force and number of the contractions of the heart. It is, indeed, in conditions of inactivity or insufficiency of the voluntary muscular system, no matter of what origin, with its incompetent effect on the general circulation, that strychnine finds one of its principal indications. That is why it is not indicated in

⁸ L. Lewin, *Die Nebenwirkungen d. Arzn.*, third edition, 1899, p. 6; F. A. Falek, *Arch. f. d. ges. Phys.*, 1884, p. 525.

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vascular neuroses, attended, as they frequently are, with increased tendency to reflex action, no matter whether they are uncomplicated, form a part of general hysteria or neurasthenia, or are connected with organic nervous disorders. Some of these neuroses are dependent on or complicated with local endocarditis or with general arteriosclerosis. In many the fundamental, in others the organic symptoms are predominant. To that general class belong the paroxysmal pulsation and dilatation of blood-vessels, mainly the aorta, the paroxysmal congestion of the face, the acute circumscribed oedema, the intermittent dropsy of the joints, Raynaud's disease, Weir Mitchell's erythromelalgia, Schultze's akroparæsthesia, and the intermittent limping called Erb's angiosclerotic, intermittent dysbasia.

METHYLTHIONIN HYDROCHLORID IN INOPERABLE CANCER

WHILE the remedy of which I shall speak is not new to me, it is new to the larger part of the profession. Methylene blue was introduced into practice in malignant tumors by Moorhof-Mosetig of Vienna. I believe the first man who introduced it into America was Willy Meyer of New York. At that time I used it a good deal by the injection method. The injections are very painful and inadmissible because it is impossible to prevail on any patient to submit to them for any length of time. Therefore, for fourteen or fifteen years, I have given methylene blue, or as it is now called methylthionin hydrochlorid, in my own way internally.

WHEN TO USE IT

As a rule we see cancer in an advanced state. Small cancers, local cancers, will very frequently go into the hands of the surgeons where they belong and the operation is certainly the first thing to be thought of in practice, but there are a great many cases that have never been recognized and that distinctly prove inoperable for that reason, together with others that have been operated on once or twice; for instance, cancer of the breast, or intra-abdominal cancer. The large majority of cases I have had in the last fourteen or fifteen years were intra-abdominal cancer of the liver, gall bladder and omentum and frequently combinations in all these organs. A number of cases occur on which no surgeon would dare to operate, not even to perform laparotomy to see what is going on inside. These inoperable cancers I have invariably treated with methylene blue.

One case was that of a woman in whom was diagnosed a cancer of the right ovary and of the neighboring structures. It was not accessible from below; it occurred

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fourteen or fifteen years ago. I gave her methylene blue. She took it a long time; she was in a low state of health; the tumor was very large; she did not get well, but when she died, after years, she had an ovarian tumor and a tumor about the size of two walnuts, only. They were cancer and there is no doubt that the whole tumor was cancer. It was reduced, I think, by the treatment. She died of her cancer, but having lived a number of years comparatively well and gaining weight, so that she was able to superintend her household. Such cases I have seen in varying numbers.

I believe I see a new case of cancer once a month at least. Of these, 20 or 25 per cent. are of the inoperable kind. Some that have already been operated on can not be turned over to the surgeon again. Then will come methylene blue treatment. I have seen such cases in fairly great numbers. They certainly count up in the course of fourteen or fifteen years. I have had one woman under observation for eight or nine years. She weighed 91 pounds at first observation; she was jaundiced and is jaundiced yet, and still weighs 91 pounds. Once in six months she reports that she is perfectly well. She is still yellow, still has lumps. Ordinarily she would have died seven or eight years ago.

One of my patients is a business man who came to me six or seven years ago. At that time he weighed 124 pounds, now he weighs 146. At that time he was not able to attend to his business. For the last four or five years he has attended steadily to his business day in and day out. A large tumor in the epigastrium has dwindled away to about the size of a walnut. He is apparently well and weighs 25 pounds more. He certainly knows that he is sick and accordingly he will complain, but he goes about from morning to night.

So I can say that I have a number of cases. I do not think, however, that I have ever cured a case. I have seen patients die during the treatment, but I have also seen them comparatively well, attending to business, living three, four, seven and eight years, and perhaps finally submit to their disease.

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In the last few months my attention has been directed to the large number of bodies that are favorably influenced by light, that have fluorescent qualities. It appears that methylene blue belongs to that class. I have commenced to expose my methylene-blue patients to the sunlight; whether it will be of any use I can not say. I have exposed them in the solarium or in bedrooms, kept them there undressed hours and hours, as long as their household or business will permit them. It is not impossible, it is even probable, that light will do a great deal more in connection with methylene blue than methylene blue alone. I simply say I am positive that it has rendered me a great deal of good service in at least 120 or 150 cases in the course of the last fifteen years. I have not gone before the profession with my results to any great extent. Only now and then have I mentioned them before societies, but never to such an extent as now. A number of physicians and surgeons in New York have had their attention drawn to the subject and are trying the remedy. It is well tolerated.

HOW TO USE IT

I give the drug in pills, in small doses, 2 grains a day, and run up slowly to 3, 4 and 6 grains a day. I have heard of bigger doses being given, but I have never required larger ones. I think the 2 or 4 grains should be made up in pills with a dose of three-fourths grain of extract of belladonna daily. I know that the extract of belladonna will relieve the dysuria much better than nutmeg, which has been recommended for that purpose. When you give 6 grains there should be three-fourths of a grain of belladonna given through the day, because adults will not bear belladonna so well as children. They are easily overdosed, they get dry throats in much less time than children with comparatively large doses. It is easy to give it in that way. I frequently combine it with arsenous acid (arseni trioxid). The dose would be $\frac{1}{40}$, $\frac{1}{30}$ up to $\frac{1}{20}$ of a grain of arsenous acid three times a day. It can be made into pills with belladonna and methylene blue, and there is no harm, when occasion requires, to give strychnia or extract of nux vomica in order to make up the pill,

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so the prescription would be 2 to 4 to 6 grains of methylene blue in four doses. It is best given after meals, one at bed time, with perhaps $\frac{1}{10}$ grain of strychnia and $\frac{1}{10}$ grain or more of arsenous acid a day with or without a vegetable purgative if that be necessary.

Patients should be told at once that the urine will be blue from the very beginning, that it will stain the linen and that the stains can not be removed. I advise, therefore, my patients to have an old handkerchief handy and to wipe off the last trace of urine. Apart from that, patients will not suffer any inconvenience. In my experience not one in twenty will complain of dysuria. The belladonna appears to act very well. I have recommended it in a number of cases operated on in order to prevent relapses. It is impossible to speak with mathematical certainty about the result of that, but I believe that relapses have been prevented. I should recommend it in every case of cancer of the uterus that has been operated on and when relapses must be feared. I believe that I have seen less relapses since that has been done. Still, an actual, statistical proof of negative experience can not be had.

CONCLUSION

Because I considered the matter of too great importance to be published prematurely, I have not spoken of it extensively before. I wanted to be perfectly sure about my results. I wanted to have a sufficient number of cases to base my assertions on. I believe I have now waited long enough. I think that after fourteen or fifteen years one is entitled to speak of a subject that appears to be of great value. It has done a great deal of good in my practice. I have certainly restored a good many people to their work. I have kept a number of people alive two, three, six and eight years longer than would have been their share.

ENTERALGIA AND CHRONIC PERITONITIS

ENTERALGIA means always an excessive irritation of a branch, or branches, of the sympathetic nerve. It is a better and more intelligent term than that of "colic," and by its nature and seat, it is diagnosticated more or less readily by its differences both from the pain occasioned by renal or biliary calculi, and from a number of affections of the surface. Amongst the latter, I refer mainly to rheumatism of the abdominal muscles, hæmatoma of the same (mostly of the rectus) brought on either by over-exertion or purpuric changes in the blood-vessels; lumbo-abdominal neuralgia; or the neurotic sensitiveness of cutaneous nerves in hysterical persons.

Enteralgia being an affection of some nerve branch or branches of the intestine, its *cause* must be sought for either in the nerve itself and alone, or in a change of either the intestinal tissues, or the contents. The nerve may be affected directly by a hysterical and hypochondriac condition, by malaria and gout, and by poisons, such as lead; or the pain may be the peripherous result of a disease of the spinal cord; or it may be the reflected effect of an irritating affection of the liver or genito-urinary organs or the skin. The latter cause is quite frequent. Indeed, sudden refrigeration of the surface, "cold," is a more frequent occurrence than is claimed by some of those who look upon everything as obsolete and fallacious, only because it is old and has once been generally accepted.

The *anatomical changes* of the tissue resulting in enteralgia may vary between a simple congestion or nutritive disorder, and an inflammation with its results. Thus the congestion of the colon, connected with the prevalence of extensive rectal varicosities, gave rise to the term hemorrhoidal colic; and enteralgia depending on every form of enteritis and colitis, ulcerations (more frequently dysenteric than typhoid) and stenosis, is quite frequent.

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Alterations in the contents need not be very great in some persons to give rise to enteralgia. Some are easily affected by certain articles of food, particularly acid ones. Certain drastics, such as senna, and many poisonous substances give rise to severe griping pain. The presence of hard scybala may so obstruct the bowels as to produce enteralgia by direct pressure or locking up gas. Putrid food, or fermentation of otherwise normal food, meeting insufficient or faulty digestive juices will have the same result. So will foreign bodies, both those that are swallowed, or such as are more permanent tenants, viz.: animal parasites.

The *definition and the exact nature of enteralgia* are not modified by the duration of the pain. It may be quite short or extend over a long time, and begin and end gradually or suddenly (paroxysmally), with temperature normal or subnormal, rarely elevated; pulse sometimes slow, sometimes innumerable; skin cold and clammy, sometimes dysuria, nausea and vomiting, constipation or diarrhœa. At the same time, the abdomen is tumid—either generally or locally; when the latter, the local tumidity is apt to change its place under inspection or on palpation. In some cases, there is no such inflation, but rather a retraction. This is so mostly in cases of strictly nervous origin; in others there is a spasmodic contraction of abdominal muscles and cremaster. With the spastic rise of the testicles, there may be connected priapism and seminal discharges.

It is the object of these remarks to direct your attention to one of the causes of enteralgia which is quite common, though it be very liable to be overlooked. But it is well to be aware always that pains may be different things; and when so, have different indications and require different treatment. Indeed, many of the attacks of pain called colic and enteralgia are only the symptoms of, mostly chronic, peritonitis.

Primary peritonitis of any kind is very rare; and then mostly traumatic, the result of wounds; probing and paracentesis for ascites included. Many more result from exposure—"colds."

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Most cases are of a *secondary nature*, with very numerous causes. It may arise under the influence of general diseases—rheumatism, alcoholism, scarlatina, measles, erysipelas, malaria, scurvy, tuberculosis, and carcinosis. The inflammation of the neighboring thoracic cavity may be transmitted through the patent stomata of the lymph ducts on the upper and lower surface of the diaphragm; and disorders of circulation depending on pulmonary and cardiac diseases will result in congestion of the peritoneum, both visceral and parietal, with its possible consequences—viz., inflammation, or ascites, or both.

The presence of new formations in the abdominal cavity acts like that of a foreign body. Adhesions to an unexpected extent are often found during ovariectomies. A sarcoma of the kidney is often glued to the colon in front of it, or to other intestines; swelled pelvic glands, in connection with irritated inguinal and tumefied mesenteric glands, will often be found with secondary peritonitis. A young woman, whom I saw dying with acute peritonitis, had been affected with purpura for some weeks; at the autopsy, that peritonitis was found to be the consequence of hæmorrhages from some ruptured vessels of the diaphragm.

Floating kidney, by its changing position and irritating contact with the peritoneum, is quite liable to light up a chronic inflammatory process, thus becoming fixed by adhesions, and dislocated after having been floating.

Affections of the vertebral column and adjoining organs will produce peritonitis; so will spondylitis, mostly tubercular, and abscesses of the bone; also thoracic abscesses following the course of the fascia downwards; and abscesses of the psoas and iliac muscles, or perforating abscesses of the socket of the hip-joint.

Amongst the most frequent causes of peritonitis are catarrhal and inflammatory diseases of the female sexual organs.

Besides the opportunities afforded by menstruation—viz., salpingitis, parametritis, perimetritis, and endometritis—there is no more frequent mischief than that originating in the sexual functions of woman. Cohabitation is some-

times, the puerperal state very often, the cause of persistent peritonitis.

The irritation or inflammation of any of the organs contained in the abdominal cavity are liable to produce peritonitis. A swelling of the liver, from a simple secondary congestion to an abscess, or a hydatid cyst, which expands the covering of the organ, makes peri-hepatitis. The presence of a biliary calculus obstructs the choledoch duct, not so often by its presence as by the local peritonitis brought on by pressure. Perinephritis will often spread and lead to intra-peritoneal inflammation; diseases of the spleen and pancreas have the same result. The intussusception of the nursling leads always, on the locality of the invagination, to local hæmorrhage and inflammation; irritation and inflammation are quite frequent in the left hypogastrium of the young, where the normally long colon of the infant is sometimes folded in a number of flexures compressing each other; and about the right and the left curvatures of the colon, as the result of obstinate constipation, with dilatation and thickening of the colon.

I remember well the case of a woman who, while carrying twins, suffered at the same time from obstinate constipation. Her confinement was normal, and she left her bed in due time. But she would always afterward complain of a constant—sometimes dragging, sometimes acute—pain far away in her abdomen. Careful repeated examinations localized the pain in front of the spine, following the exact course of the abdominal aorta. The diagnosis of aortic perivasculitis could safely be made and was borne out by the further course of the symptoms. While she was getting much better, a trip in a jolting wagon over a mountain road gave her not only an increase of pain, but an extension of the local affection into a peritonitis, the consequence of which she will feel all her life-time.

The most frequent cause of peritonitis is, perhaps, a preceding peritonitis. Indeed, when a case is examined after death, the positive proofs are found of one or more attacks preceding the fatal one. Thus if not the proxi-

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mate cause of death, at all events the main cause may be set down to have been a previous attack. I do not remember a case of perityphlitis but what exhibited the adhesions, discolorations and contractions due to former peritonitis; frequently the vermiform process was attached to the side or the posterior wall of the colon; the tissues of the intestine were thickened, the parietal peritoneum whitish and thickened, and the orifice of the process patent. Indeed, it is probable that there are few, if any, cases of foreign bodies entering the process unless the latter have previously lost its elasticity and contractility by an inflammatory change.

Anatomical changes—Alterations of the mucous membrane of the intestine are the initial stages of local peritonitis in many instances; of general peritonitis in some. It is not only the intima and submucous tissues which are suffering, but the muscular layer is implicated in the morbid process. It is not necessary here to recall the histological changes; it suffices to point to the clinical and anatomical fact that a simple intestinal catarrh is growing easily and speedily into an enteritis. The vascular connection between the three principal layers of the walls of the intestine is such as to facilitate the transmission of an inflammatory process from one to another. Thus it is that a peritonitis—that is, the inflammation of the serous membrane—is communicated to the muscular and mucous tissues, thereby spreading œdematous infiltration, paralysis and constipation; thus also it is that a common diarrhœa is able to develop in a shorter or longer time a local peritonitis. If it were necessary to exemplify this intimate connection of the two, it would perhaps be a desirable illustration to recall the facility with which anatomical changes take place in the mesenteric glands in the course of a common diarrhœa. No morbid process can be expected to be isolated in a locality which is supplied with an active blood and lymph circulation. Thus it is that an intestinal catarrh grows to be an enteritis, the enteritis a peritonitis.

This condition of things is still more frequently observed in cases of intestinal ulceration, both acute and chronic.

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The most intense form is the peritonitis following the perforation of a gastric or intestinal ulcer with its speedy fatal termination. But without perforation, an ulceration will lead to peritonitis which is mostly local, or local in the beginning, and liable to change into an acute attack under favorable circumstances. It is very easy to verify the following condition of things: Where there is an open ulcer, or one that had cicatrized months or years before, in the stomach, or in the intestine, no matter of what nature, either catarrhal, or dysenteric, or typhoid, or tubercular, we frequently find opposite the ulceration or cicatrix that is in the peripheral covering, a local peritonitis. There is a thickening, circumscribed and distinct. In recent cases, it is rather soft and succulent, with much vascular injection; in old cases, the original cell proliferation has undergone organization and hardening, the thickened spot is gray, whitish, hard, and has lost its elastic and soft feel. Not only does it *feel* less elastic; it *is* so. It is very apt to burst under a moderate amount of pressure, and lead to perforation. In the midst of apparent health, intestinal perforation will set in, and death ensue within a day. The mysterious catastrophe is explained by the autopsy which reveals a perforation in the midst of such a local peritonitis as I have described. Then only it is that the medical man will learn that the man called away so suddenly was the victim of the perforation of the cicatrix of a typhoid ulceration contracted a dozen years previously.

Many years ago, I presented to the Pathological Society of New York the specimens of the intestine of a child who died with intussusception not reduced. It was a very unusual case. The invaginated mass from six to eight inches long reached into the rectum. Many attempts at reduction were made—from the use of big sounds, to inflation of air and injection of water. At the autopsy half a dozen perforations were found, some of which were complete, some partial, in such a way that only the adventitia had burst. None of the perforations were within reach of the instruments used for the purpose of relief; but around all the rents there was the peritonitis,

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thickening and discoloration, and the general anatomical changes described before; and generally the wall of the perforation was found raised beyond the level of the neighborhood, so that where the wall was thickest it was most fragile.

What was the cause of all this, in the apparently healthy and well-developed child? On inquiry only it was found that two years before the fatal attack the boy had suffered from "summer complaint" for a number of months; and that he had often had "cramps," crying spells, colics and the like, since.

The *diagnosis of chronic peritonitis* is frequently missed. As stated before, unforeseen adhesions are often found round tumors; movable kidneys become fixed, intestines glued together—all without recognizable symptoms.

In chronic peritonitis, *respiration* need not be accelerated; particularly is that so in pelvic peritonitis, perimetritis, and pericystitis. There may be occasional *vomiting*, particularly where there happens to be an intervening acute catarrh; but there are other conditions—for instance, renal and biliary colic—which are more liable to exhibit that very symptom to an excessive degree. Indeed, it is so often absent in chronic peritonitis that its very absence, being a negative symptom, is not of much account. Even in many acute cases it is not met with. There is, for instance, none in twenty-five cases out of a hundred of septic peritonitis of the newborn. *Constipation* is frequent, diarrhœa not unusual. *Horizontal posture* is often quite uncomfortable; but a common colic depending on gas not absorbed or expelled induces the same posture (viz.: the knees drawn up) in most instances. However, when horizontal posture is shunned in chronic peritonitis, the patient is more apt to be quiet with raised knees than he who is suffering from flatulency; very few of this class will abstain from kicking and moving. The *abdomen is apt to be tumid*, but it must not be overlooked that general adiposity is mostly developed on the abdomen; that women who have had children are liable to have large and prominent abdomens; that that of the healthy baby is so large as to measure one-third of his whole length; that a simple

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hysterical dilatation and inflation may simulate that which is produced by peritonitis; that with the former, there is sometimes an œdematous swelling of both hypogastric regions, which complicates the diagnosis still more seriously, and that there may occur a local dilatation of an intestine from habitual constipation only. The *surface of the abdomen exhibits nets of dilated veins* more frequently in peritonitis (and hepatic diseases) than in any other morbid condition. Now and then there is a friction sound or a slight crepitus *on auscultation*; *inspection* may also reveal solitary convolutions which rise above the level; and *palpation* may lead to the discovery of exudations in various shapes and sizes, nodules, lumps, cakes, hard and soft, which are either organized material or glued intestines. *Percussion* may discover these solid masses, or fluid contents. *Fluctuation* will show ascites more readily than percussion, for the latter may fail in this, as there may be adhesions between the parietal peritoneum and intestine in the flanks. The gas contained in the adherent bowel will then yield the tympanitic percussion note, though the region may be filled with fluid; a change of posture, from side to side, or from the horizontal to the vertical, may contribute to dispel the doubt.

A chronic peritonitis is sometimes diagnosticated with more or less certainty in the following manner: The patient is on his back, extremities now extended, then again flexed. Pressure is tried—soft, hard, sudden, or gradual, superficial or deep, in the usual way. Often the seat of the *pain*, inflammation or adhesion is thereby made manifest. In many cases, however, the following manipulation answers best: Make deep pressure with the palm, fist, or a finger. Perhaps there is no pain. Relieve the pressure at once, and a local, very distinct and circumscribed pain may be felt. Repetition of the experiment will give the same result always, the symptom being elicited by the sudden change in the relative position of the bowels. Not only pain, but the presence of floating exudations can be distinguished by this and similar manœuvres.

Every change in the relative position of the bowels may rouse a pain. A sharp pain after a full meal may point

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to adhesions of the stomach; three or four hours after eating to chronic colitis; a quickened inspiration or a cough, to perihepatitis; toward the end of micturition, to pericystitis.

Pain is a very frequent symptom in chronic peritonitis. It may be mild, severe, of short duration, or persistent. Its variability depends often on the degree of irritation or congestion. Acute attacks are frequent when there is a cause for exacerbation.

On the 22nd of September, 1884, I saw a boy of eight years with Dr. G. He was known for years to have suffered a good deal from abdominal pain—sometimes for a short time, sometimes half a day. It was mostly located in the right hypogastrium; now and then in the epigastrium, and frequently complicated with constipation. It had disturbed him sometimes during school hours, and more so his elderly school-mistress, who hated stomach ache occurring at improper times. About the 8th of September the child swallowed a cent—no serious consequences following. On the 22nd he went to school in perfect health, was taken with severe pain in the right hypochondrium at ten o'clock, was kept in by his intelligent teacher until noon, and, stooping, crept more than he walked until he finally reached the bed, from which he did not rise. The pain was intense, mostly on the right side; the abdomen was swollen correspondingly with the pain; the thighs were drawn up, temperature rose, and peritonitis became general. On the 25th the temperature of the rectum decreased very much, and the child died in general collapse.

At the autopsy, which was made on the 26th, there were five hundred grammes of pus in the abdominal cavity; strong adhesions—old and new—of the intestines amongst themselves and with the abdominal wall; a poppy stone in a hard fecal mass in the vermiform process; one perforation, two gangrenous spots and firm angular adhesion of the vermiform process to the colon, of various thickness and shades of color, thus proving, and also by its hardness, the cause of the repeated attacks of local peritonitis the child had been suffering from for years, and

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explaining the many enteralgias complained of from time to time.

The seat of the pain varies with the location and the extent of the lesion. Extensive peritonitis in the pelvis may not give rise to pain except such as is waked up by defecation, cohabitation, or micturition. Attending pericystitis is well characterized by its pain, which appears when the urine has been voided about one-half and the bladder contracts more efficiently. In this it resembles much the spasmodic pain of vesical catarrh, with this exception, that it is more localized above the pubes, and manifests itself by pressure more readily.

In most cases, the pain of chronic peritonitis can not always be *diagnosed from the enteralgia produced by other causes*, such as abnormal contents, fermentation, flatulency. Indeed, the anatomical changes of chronic peritonitis give rise to those other conditions. By it the intestinal movements are retarded; stenosis may result from it, also twisting and adhesions; and through them every function is seriously interfered with. If it were easy, or in many cases possible, to make the diagnosis of the pain, the mistakes would not be so frequent; and the condition of things of which you have permitted me to speak before you, could not to-day be the subject of our discussion.

The *results of chronic peritonitis* are very various. A simple attack of acute exudation may shape the future of the patient. I knew for years an elderly lady of perfect health, not disturbed except by flatulency, constipation and frequent enteralgia, which she dated back to one of her confinements. The diagnosis of dilated transverse and descending colon could be made easily. Purgatives administered in regular intervals and two daily enemata would keep her regular and without pain. The amount of water admitted to the bowels was large. Thus if there were a stenosis, it must be at a distance from the rectum; besides, no vaginal or rectal examination revealed the presence of a tumor or swelling. When the autopsy was made many years afterwards, in Zurich, Switzerland, there were found many discolorations and thickenings of the adven-

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titia of the colon, some old adhesions of the descending colon to the abdominal wall, and a hard and massive band extending from the left ovary to the junction between the middle and lower third of the colon; the latter was constricted to half its original size.

There was a girl of seven years in Bellevue Hospital five years ago. She entered with a history of enteralgia, emaciation, loss of appetite. Her pain lasted sometimes for hours, sometimes for days; followed exertion, exercise, eating; was sometimes mild, often excessive; raising the knees, passing of flatus, of urine, or belching would now and then relieve her—at other times not at all. Thus it appeared that the attacks were not always alike, and were probably the result of a variety of causes, partly mechanical, partly functional. The underlying cause of them all was chronic peritonitis. There was pain on pressure, some ascites, and a large number of swellings, more or less hard, of the size of a hazelnut or hen's egg, numerous, and big enough to be mistaken for neoplasms; now and then an exacerbation of temperature. All this made the diagnosis of chronic peritonitis safe enough. She was kept in bed for months, with careful diet and wine of pepsin; absolute rest, poultices, a daily enema, and iodide of potassium in the beginning, iodide of iron afterwards. She left the hospital well and hearty, with no perceptible tumors, with no pain for many weeks, and supplied with a bandage to protect her. She remained well, and died of a non-tuberculous pneumonia two years afterwards.

I was fortunate enough to obtain the *post-mortem* examination. There were whitish discolorations of the adventitia, and thickening of the intestinal wall in many places; very strong and numerous adhesions between the convolutions; thickening, and in part shriveling of the omentum, and a few hyperplastic glands of non-tuberculous character.

This was a classical case, but one of the unusually severe ones of the class the picture of which I have tried to draw for my fellow practitioners who are constantly called upon to meet them.

The histories of previous acute attacks of peritonitis are

often not remembered. One of the greatest physicians and surgeons New York ever called its own, died fourteen years ago, during his convalescence from typhoid fever, of peritonitis. He had often complained of enteralgia and occasional attacks of diarrhœa, during the twenty years I knew him intimately. But it was only during the first leisure of his life, viz., the long weeks of his dying, that he remembered having suffered from peritonitis thirty years previously. At the autopsy we found discolorations in many places of the serous membrane; degeneration, dilatation, and atrophy of the colon to such an extent as to result in a number of perforations. From such a case it becomes evident that there are, and how it happens that there are, so very many extensive adhesions and other changes without any history whatsoever.

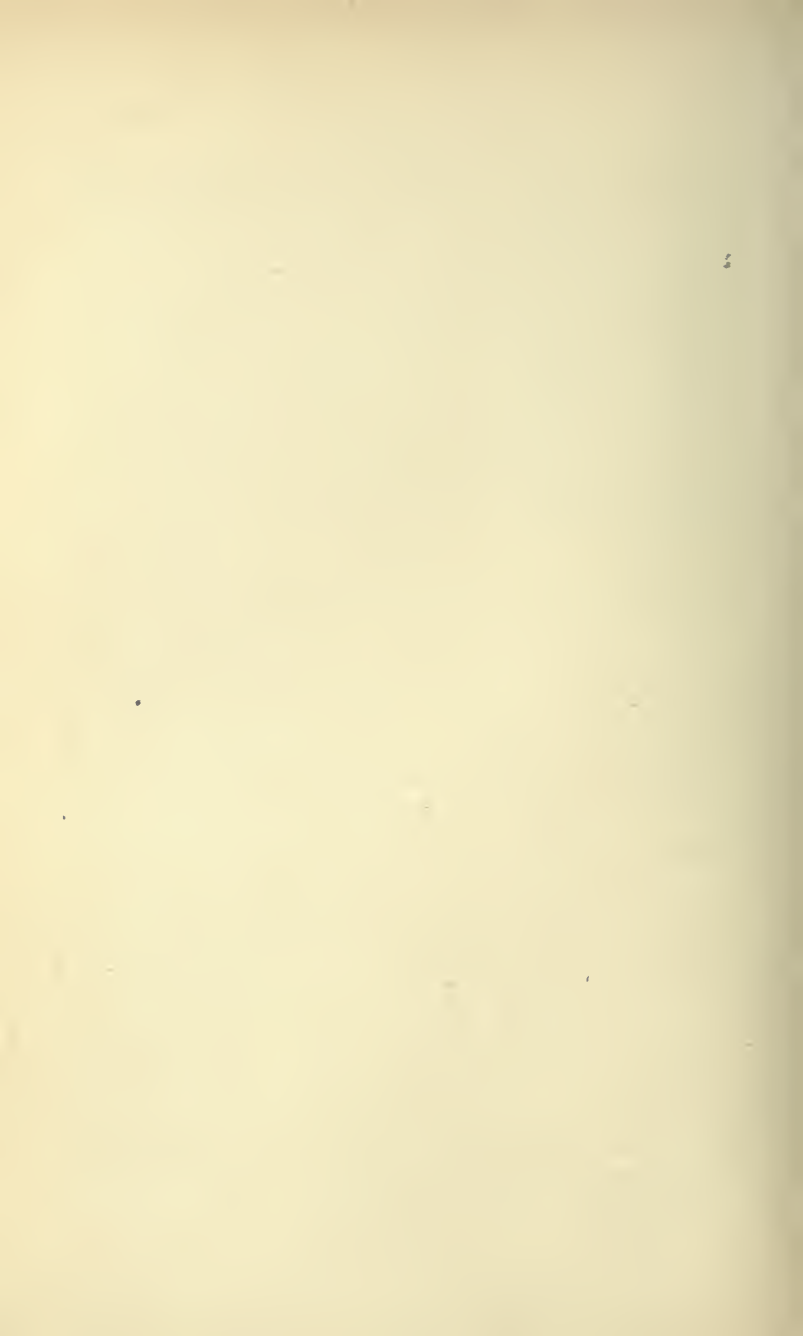
Treatment of Enteralgia Depending on Chronic Peritonitis.—The indications for treatment are given by its results and symptoms, amongst which are prominent, besides the pain, sluggishness of a part of the intestine, constipation, adhesions and bands, and intervening sub-acute and acute peritonitis. The latter require appropriate treatment, such as absolute rest, with support for the knees; ice or warm or hot applications according to circumstances, and opiates in sufficient doses. As a general treatment, the latter are more justified than the sulphate of magnesium and turpentine enemata recommended by some. For the treatment under which an occasional patient may escape death, must not supersede one which has proven to be successful in most cases, and beneficial in every one.

The localized attacks, mainly in the right hypochondrium, demand local applications; occasionally a few leeches, and subcutaneous injections of morphia may become necessary. Old adhesions and organized bands are not amenable to medical treatment; and the surgical interference sometimes demanded by such anatomical changes do not concern us here. A person afflicted with chronic peritonitis, such as I have described it, must not choose work which requires great physical exertions, straining and lifting; must avoid injuries, pressure on the abdomen, jumping, jolting, and straining during defecation, or working at the sewing

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machine, etc. His bowels must be kept regular by a daily enema, even when there is an occasional apparent diarrhœa, for this diarrhœa is often complicated with constipation and alternating with it.

Besides the daily enema, my main reliance is on the wearing of a snug bandage which must cover the whole abdomen, and is fastened low down by soft straps passing under the perineum, both in front and behind. Thus, jolting and moving of the intra-abdominal contents are avoided. That bandage must be worn until the patients have not complained for years. In hundreds of cases I have known it to give immediate relief; without the immobility given by it to the sore intestine, I do not expect a case to do well.



PERIBRONCHITIS AND INTERSTITIAL PNEUMONIA

THERE are those, like Stoffela, in whose opinion interstitial pneumonia is never primary, or, like Eichhorst, who believe it is mostly secondary. In Jürgensen's opinion interstitial pneumonia is not a clinical, but an anatomical entity.

The father of modern macroscopical pathological anatomy, Rokitansky, claimed that tuberculosis and hyperplasia of connective tissue could originate on a common soil, that is, alongside each other. Heschl reported his observations of its endemic character, finding it rarely in Vienna, frequently in Cracow. Some met it exclusively with other diseases, Buhl with what he described as desquamative pneumonia, and Lebert with croupous pneumonia. Some German-speaking authors, however, like Amberger have a few cases of a primary diffuse chronic interstitial pneumonia. Eppinger and Wagner declared it to be an occasional independent disease of the lung parenchyma, and Heitler, in a long but interesting paper in the *Vien. Med. Wochenschrift*, Nos. 50, 51 and 52 of 1884, publishes five cases of a primary interstitial pneumonia in adults. He calls the condition a parenchymatous pneumonia. He quotes amongst the French, Grisolle and Chomel, who knew of the independent occurrence of interstitial pneumonia. Both, however, describe it to be exceedingly rare. Andral must have seen it more frequently. He makes the positive statement that it need not necessarily develop out of the croupous form, that it may be either local or very extensive, and that while an acute course is observed, it may be chronic and result either from an acute affection or run its independent course as a slow process. The modern large manual of Grancher, Marfan and Comby scarcely mentions it.

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Amongst the older English writers Corrigan speaks of it as an independent slow inflammation of the pulmonary connective tissue; Stokes knows both an acute induration, and a cirrhotic, grayish, rather anemic sclerosis, and Walshe claims that before cirrhosis can develop, there must be a previous hypertrophy of tissue. (Heitler.) Such observations prove the soundness of British medical life. There has been no time in English medicine, in which mere theories and fads could distort the clear sight of English clinicians. Even Brown had to look for enthusiastic support, which he could not find at home, in Germany, France and America.

In the *Traite de Médecine* by Charcot, Bouchard and Brissaud, Vol. IV., p. 471, the scleroses of the lungs are treated by A. B. Marfan. He divides them into the lobar, bronchial or lobular, and pleural varieties. The first includes malaria poisoning, the second dust inhalation, grippe, syphilis and senile changes; the third comprehends those originating in pleural or cardiac diseases. Under a fourth heading he describes what he calls badly defined forms of pulmonary scleroses. This form, first mentioned by Laennec and Andral, and studied by a number of histologists, consists in an affection of the whole interlobular, inter-alveolar, and peribronchitic connective tissue. The first stage is a cell infiltration, the second fibrous transformation. This form has often, he says, been taken for tuberculosis in spite of the absence of bacilli and on account of the presence of abundant bloody and serous expectorations. In the few cases carefully studied by Heschl, Eppinger, Marchand and Wagner (13 years, 47 years, 27 years, 47 years) the first days behaved like a genuine pneumonia; but dyspnea and cyanosis led to death. Marfan concludes that these cases also belong to his lobar sclerosis, that means that form which is directly connected with, or derived from, croupous pneumonia.

Our text-books, Tyson, Anders, Osler and others, hardly mention chronic pneumonia except in connection with other forms. In Osler's work diffuse interstitial pneumonia is met with under the following conditions: (1) As a sequence of acute fibrinous pneumonia. (2) As a sequence

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of chronic bronchopneumonia. (3) It is pleurogenous. (4) Due to the inhalation of dust. (5) Due to syphilis. (6) Due to compression by aneurism or a new growth, or the irritation of a foreign body in a bronchus. In another part of his book (p. 331 of the fourth edition) he appears to explain the retracted condition of the apices by the presence of tuberculosis only.

In a very able, concise and elaborate article, Winslow Anderson, in the sixth volume of the *Twentieth Century Practice*, treats of the subject of chronic pneumonia, which, according to him, is synonymous with interstitial pneumonia, cirrhosis of the lung, induration of the lung, pulmonary fibrosis, and fibroid phthisis. Other authors have additional names. His first statement is that it may be local, when it encapsulates morbid deposits and irritating substances, such as tuberculous deposits, hemorrhagic infarctions, abscesses, or foreign bodies; it is more apt to be general, when it depends on croupous or lobular pneumonia or pleuritis. It is always, in his opinion, a secondary disease, and its earlier symptoms are always disguised by the pre-existing affection. It may be suspected when, after a lobar or lobular pneumonia has terminated, the dullness on percussion, bronchial breathing, slight elevation of temperature and cough and dyspnea continue beyond the period at which resolution should have taken place. There is mostly bronchial catarrh and bronchiectasis, ulceration of the bronchial mucous membrane, putrefaction of the secretions, and hectic fever; always cough and pyrexia, sometimes blood in the sputa. Indeed, there is nothing but your fibroid phthisis.

In the supplement to the *Twentieth Century Practice* issued in 1903, the same author speaks of chronic pneumonia "as the so-called interstitial or fibroid phthisis." That is why his treatment is as follows: warm, equally humid climate, no high altitudes, temperature of the room not below 60° F., four meals a day of highly nutritious or predigested food stuffs, olive oil one hour after meals, balsamics for copious expectoration, atropin, dionin and subcutaneous injections of heroin hydrochlorate in $\frac{1}{24}$ grain doses. Thereto he adds narcotics and hypnotics,

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which mean the armamentarium required for those whose only claim is euthanasia.

In his pathologic-anatomical diagnosis of 1900, Orth distinguishes five forms of pneumonia, the fibrinous, the catarrhal, the purulent (inclusive of the pyemic), the caseous and the productive; all of them have in common the formation of new connective tissue. In the fibrinous variety carnification, as it is here called, is a rare result; in it the alveolar septa are thickened by new formed connective tissue, and by vascular granulation tissue. Both compress the alveoli with its exudate, which undergoes absorption. This process is almost always complicated with pleurisy and bronchitis. Catarrhal pneumonia exhibits a similar process, when the exudate contains much fibrin. Tissue hyperplasia is the result. Caseous inflammation is either a bronchiolitis complicated with fibrous pneumonia; or a true caseous hepatisation with the proliferation of connective tissue cells in the alveolar septa and mainly the intima of the blood vessels. Complication with tuberculosis is not uncommon in this form. Or it is caseous peribronchitis, which is met with in bronchitis and in pneumonia. It is a real new formation of tissue, not the result of inflammation, is found in small deposits and for that reason often taken for tuberculosis. Orth's fifth variety of pneumonia is the productive, that is, cirrhosis. It is found in the cicatrizations around infarctions, new caseous processes, in the shape of peribronchitis, fibrous bronchitis and fibrous pneumonia. The peripheries of these deposits are gray, their centres yellow. In fibrous pneumonia the septa are thickened by connective tissue, they feel and cut like fibrous tissue, there are long grayish septa, the lumina of the alveoli are narrow, their walls sometimes adherent. These indurations are preferably found in and near the apices, and if there be caseous masses near by, they may heal under the influence of pressure, and lead to the autopsy-findings of calcium or of bone.

In the consideration of interstitial pneumonia we meet with syphilis as one of its main causes in all our literature.

Syphilis of the lung was known four hundred years ago. Paracelsus and Morgagni described it; John Hunter denied

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and thought he buried it; Ricord and numerous others resuscitated it, and all of us have made its acquaintance. In the young it is more often encountered than in the adult, at least in our era; in hereditary syphilis it is much more frequent than in the acquired, on account of the direct connection in the fetus, through the ductus venosus Arantii, of the umbilical and cava veins. Many of the syphilitic manifestations are known as white pneumonia; it is met with in the still-born or those who die soon.

In one or more lobes, sometimes over both lungs, the alveoli are filled with epithelia in fatty degeneration, and the parenchymatous septa are also infiltrated with cells; occasionally there are gummata. But this is not the only change, for there is no doubt (Orth) that in white pneumonia there is an interstitial pneumonia as well; and Cornil describes a fibrous change of lymph vessels, with nodes in their walls and caseous degeneration of the endothelium.

Of more import both to the patient and the physician is the exclusively interstitial form of syphilitic pneumonia. There is proliferation of cells, increase of the tissue surrounding the vessels and the bronchi, with subsequent cicatricial shrinking. Gummata are rare in the form, cavities not very infrequent. It is often complicated with the same changes in the pleura. Indeed, many cases appear to originate in the pleura, or in the hilus. Hyperplasia and induration are very marked in this syphilitic form, to such an extent that atrophy of the glands in the mucous membranes, disturbances of the pulmonary circulation and secondary disorders of the heart (hypertrophy and dilatation), are nowhere more frequent. The claim, however, that these heart disorders are a symptom of no other form of interstitial proliferation is untenable. This form is not necessarily fatal, not even at puberty. The puny, undersized and underweight children of from five to eight years that thrive better after a protracted antisiphilitic treatment than after iron and arsenic show frequently the symptoms of interstitial infiltration and retraction.

A non-specific inflammation, at first rich in cells and succulent, afterwards devoid of cells and retracting and indurating, is met with along the outside of the bronchi, in

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the blood vessels, in the interlobular and interalveolar connective tissue, with compression and disappearance of the alveoli. There is in the beginning a new formation of capillaries, and an immigration of cells besides those that develop locally. The thickening of the cellular tissue is very often, not always, dependent on pleuritis; in that case there is, in autopsies, a distinct fibrillation extending from the pleura into the lung. Very often, however, the same process begins in the interior, and leaves the pleura intact. The whole process is almost always local, on one side, in one lobe, or in part of a lobe. That is, mainly when the process is independent. Then it is mostly an apex that is affected, almost always the right, and slowly the disease extends downwards to the neighborhood of the third rib or below. The results are briefly:—deficient respiration, retracted lung tissue, deformity of the chest, vicarious emphysema, bronchiectasis with copious secretion, and occasional abscesses, or new connective tissue formations in the shape of firm indurations, or even osseous deposits. But there are many more cases that do not run through the whole course of this degeneration, but remain indolent and innocuous in the stage of retraction and cirrhotic atrophy.

In most of what I have presented to you I have meant to do justice to the observation on the dead. Clinicians, or let us be modest and say practitioners like ourselves, know what they owe to the study of the dead body by ourselves and our masters, Morgagni, Broussais and Rokitansky. But is there an exclusive value in the description of the latest result of a morbid process? Three months or years may have passed since it commenced, suspected first, and closely watched by you in all its varieties of changes, until the dissecting knife took the place of your stetho and microscope. What can the condition encountered between the last breath and the burial tell then about the first beginning of the process? Its origin and development are under the observation and care of the practising physician. About them he knows more than the pathologist. Moreover, he sees a great many cases that are never seen by the anatomist. In fact, the vast majority of cases of interstitial pneumonia and peribronchitis are such as get well, if not

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anatomically, still practically, and their owners, when they finally die, are taken off not by the remnants of their interstitial hyperplasia, but by some incidental process. It is particularly in infancy and childhood that this class of hypertrophy of the connective tissue, terminating in shrinking, is most frequently, almost exclusively, observed.

I think I have quoted enough to show the opinions of some of the best authorities. Let me add a single quotation which may be the text for my sermon. In the different editions of my "Therapeutics of Infancy and Childhood," and in previous writings, I find the following: "There are three anatomical varieties of pneumonia in infancy and childhood; the catarrhal or lobular, the fibrinous or lobar, and the interstitial. Nearly two-thirds of the cases belong to the first; nearly one-third to the second, and a limited number to the third class. Not one of them, however, is always found pure and uncomplicated. Indeed, complications of the lobular with the lobar, of either of them with the interstitial and possibly of each of the three with pleuritis are quite common. . . . Interstitial pneumonia runs the most protracted course. Fever is liable to be high and prolonged over weeks and months; recovery is rarely complete, induration and retraction of the pulmonary tissue, with bronchiectasis, are quite common."

These remarks are the outcome of clinical observation, extended over dozens of years amongst patients of all ages. What I have opportunities to see weekly is, as follows:—An adult, mostly a man, appears with a complaint not connected with his lungs and is examined. Another turns up with a tale of woe. He has been examined by a physician and told that his lungs are affected and unless he goes to Colorado at once, he must die. They never knew their lungs were affected; they have neither cough nor expectoration; their chests are asymmetrical; there is flattening on one side, depression of an apex, diminished respiration over the corresponding part of a lung, slight or marked bronchophony, slight bronchial expiration, or thoroughly pronounced bronchial respiration, but no rôle, no history of a cough, of expectoration or of a lung disease as long as they

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remember. They are often persons in middle life, sometimes well advanced in years. When other cases are seen in adolescents or those out of their teens, an intellectual mother remembers he or she had a pneumonitis, a bronchitis, a lung fever, or a long ill-defined feverish disease, when an infant or young child. Not infrequently the case was a very protracted one, and many fevers would follow one another. In other cases there is no history except that which is indelibly inscribed in their lungs. Adults with the lesions I described are numerous. I feel certain that amongst four thousand office patients, I meet at least fifty such a year. The majority are adults; their history dates back to infancy. Others are children with the same local lesion but a more distinct record. A previous illness is remembered; in many cases the diagnosis was not made.

What I aim at is that these cases should be appreciated at their full but no exorbitant value. While a great many are the results of a complication of intrathoracic diseases, there are many that run an independent course in the connective tissue either of the bronchial walls or the trabecular or interalveolar septa. There will be plenty of opportunities to verify my experience of a lifetime on the part of those who are not wedded to the thought that the symptoms described by me are invariably due either to tuberculosis or to pleuritis.

SYMPTOMATOLOGY AND DIAGNOSIS

W. V. Leube, in his "*Specielle Diagnose der innern Krankheiten*," Fifth Edition, Vol. 1., p. 138, has the following remarks:—"The diagnosis of interstitial pneumonia is almost always of very little clinical importance. It mostly serves only to complete that of other pulmonary diseases. It accompanies the various inflammations of the respiratory organs, chronic bronchitis and pleuritis, the suppurating, gangrenous and caseous processes and neoplasms, and rarely the croupous and catarrhal processes which affect the surface of the alveoli only. A greater importance belongs to interstitial pneumonia when it follows the inhalations of metallic and other dusts and is connected with syphilis."

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Now, what I have tried to suggest or to communicate, is the much-neglected fact that so-called interstitial pneumonia, or what I should prefer to call it, pulmonary hyperplasia with secondary cirrhosis, is a frequent and frequently independent disease. Moreover, that the full recovery from it, at least as far as the life and comparative health of the patient are concerned, is by no means an uncommon occurrence; that, indeed, a certain measure of pulmonary cirrhosis is not an obstacle to comfort and activity.

The diagnosis of that independent form has its difficulties, less when it appears in its acute than when in its subacute form. Its duration is uncertain; it lasts from a week to months. The temperature is high only in acute attacks; it is mostly moderate, with its morning remissions, rarely with intermissions. An uncomplicated croupous pneumonia undergoes a more or less typical resolution, after six or nine days, rarely after three; the catarrhal pneumonia requires a very much longer time, but its diagnosis—from its incipency in bronchitis, its mostly bilateral and posterior location—is generally easier than that of some cases of lobar pneumonia. We all know that the latter is frequently suspected—on account of subjective and objective symptoms—but not proven by auscultation and percussion.

Not uncommonly bronchial respiration is not ascertained before the fourth or fifth day. In not a small number of such cases I have noticed that they would run a very slow course, that it would take many weeks before the lungs became normal or nearly so. In many of them you will find that it is the upper lobe that exhibits these symptoms and this course. As I have paid attention to these conditions two score of years, I have met with a great many cases that would finally get well, apparently, but there would remain: some dullness and diminished or bronchial respiration. What does that mean? It means that the case was either from the beginning an interstitial pneumonia, or that it was a complication of the croupous and interstitial forms. More! Such cases with retarded diagnosis and retarded—partial—recoveries are the very ones which have the tend-

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ency to relapse. When a child has a number of pneumonias in the course of its infancy and childhood, having been apparently well in the intervals, an attentive observer of the well child will mostly find the physical signs of interstitial induration. It is true the complication of the two varieties is one of degrees.

Uncomplicated croupous pneumonia is a surface inflammation. It does not result in induration. There are only few, if there be any, that last months, do not undergo connective tissue hyperplasia and still get well. But it should, on the other hand, be remembered that a recent cell proliferation and fibres that are not quite hardened may undergo absorption, though they be not syphilitic.

The diagnosis from pleuritis may become difficult; that of the latter is not always so easy as those may believe who always look for dullness or flatness, for local pain, for friction sound, and rely on the result of a premature or a timely puncture. Interstitial pneumonia, when independent, is mostly in an upper lobe, pleuritis more frequently over a lower, or all over. When serum or pus make their appearance early, the diagnosis is easy; not to speak of those very bad but fortunately rare cases in which the diaphragmatic exudation results in compression of the ascending cava, in congestion and speedy hypertrophy of the liver, and in dropsy of the lower half of the body. The diagnosis of an early complication of pleuritis and interstitial pneumonia may easily be missed at first; later, when the symptoms of pulmonary alteration become more evident, it is again, in interstitial pneumonia, the upper part that is most affected.

The diagnosis may sometimes become more difficult on account of the deformities following either; still the flattening of the surface in interstitial pneumonia is mostly referable to the chest wall, that means principally the ribs, while pleuritis is apt to result in atrophy of the muscles of the chest and the shoulder, with or without pain. This difference may mislead, however. But there can be very few cases only, in which, after a long time, the location of the symptoms in the upper (mostly right) lobe in interstitial pneumonia, and of those of pleuritis, friction sound

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included, mostly over the lower, will not lead to a correct diagnosis.

Tuberculosis is mostly found in the upper lobe, even in the apex, mostly in the right, but there are few cases in which the left is not also infected. Interstitial pneumonia is often found in the upper right lobe only. In the child tuberculosis is apt to spread more generally than in the adult over all the lobes; indeed, its deposits are frequently found in the lower lobes. Tubercular pleurisy spreads soon over the whole pleura of one side. I find it seldom bilateral. Though it be isolated, and not the result of general tuberculosis, it soon gives rise to friction sounds and a very extensive, though not very marked, dullness. Chronic tuberculosis of the lungs is not rarely complicated with laryngitis (less so with enteritis); that is not so with interstitial pneumonia. Tuberculosis is always attended by râles and by cough; in later periods the expectoration does not become fetid. As a rule, interstitial pneumonia is not. I have often been impressed with the suspicion that the observations of apex tuberculosis, not confirmed by the finding of bacilli, were mistaken; that they were in fact local interstitial pneumonias, which finally got practically well, with induration and retraction. Besides, many cases of tuberculosis go hand in hand with an interstitial process and will get well the more readily the more they are connected with interstitial proliferation. Many of you will remember that the action of Koch's tuberculin was believed to consist in the rapid new formation of connective tissue, which was expected to surround and hide the bacilli, and thus to render them innocuous.

Altogether we may say that capillary bronchitis and lobar pneumonia have their symptoms below and behind, tuberculosis and interstitial pneumonia above, and mostly in front, pleuritis with effusion below and mostly behind, and pleuritis with effusion sometimes, and tubercular pleuritis always, both above and below.

Atelectasis in the infant may persist, rarely by itself, but is usually followed by inflammatory processes, or by emphysema. Two cases of small children, whose asthmatic attacks dated from the earliest infancy, made me connect

the latter with the known history of atelectasis of the first weeks after birth. Compression of the lungs by persistent pleural effusion, which is finally absorbed in the same degree in which the flexible chest adapts itself to the smaller compass of the enclosed viscus, we all see. It has its own well-diagnosed history.

Percussion.—Over the retracted apex and indurated lung there is dullness, and more or less resistance to the percussing finger. Induration of the lower lobe allows the diaphragm to ascend. The liver dullness extends above its normal line, and remains stationary during respiration, whenever the lung is tightly adhering to the chest wall. Secondary emphysema and bronchiectasis and the cavities of fibroid phthisis yield their well-known physical signs.

Auscultation.—The respiration is vesicular, strongly puerile in the young; in complication with bronchitis there may be râles; for short periods this complication is frequent. It disappears and reappears in acute cases, is seldom met in the chronic. After a while the respiratory murmur becomes feeble, *pari passu* with the development of the connective tissue hyperplasia. When atrophy begins, and sometimes before that time, the respiration, mostly expiration, becomes bronchial. This symptom appears late in, subacute or chronic cases, but it lasts, usually forever. It is preceded by bronchophony. There are few râles, or none, in the beginning; none in those instances which remain unchanged, more or less local, and do not degenerate into fibrous phthisis, or are not complicated with emphysema or asthma. Sometimes auscultation, sometimes percussion is more characteristic of the solidification and retraction. In those degenerated cases which are described in all the text-books, râles of every description, the symptoms of cavities, copious expectoration of serous, mucous, purulent, sanguineous, or fetid sputa become evident. They are well known, but not observed in the frequent, comparatively mild cases which are the subjects of this communication. Excuse me for again emphasizing that I speak of the latter, very frequent, and often overlooked class.

In a great many of my cases I find the inspiration interrupted, in installments as it were ("saccadée"). This

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latter symptom belongs by no means to pleural adhesion alone.

Cough.—I wish to be emphatic, though my assertion may appear to be overdrawn. There is, in these cases of mine, no cough. Acute cases run rarely without some bronchial irritation, but even in this class there are many that do not cough. When there are rational symptoms and the diagnosis of pneumonia, but little cough, it means interstitial pneumonia. When the case is old, and retraction established again, there is no cough. The authors who speak of cough as a frequent and harassing symptom, or as an early symptom, who describe a dry, or moist cough, and a copious, sanguineous, or fetid expectoration, have seen, or remember, only those cases in which there was an early intense complication in which the latter played the principal part, or the secondary processes of fibrous degeneration.

The Heart and Blood Vessels are affected in proportion to the amount and duration of the induration and retraction. Considerable atrophy of the tissue implies compression and disappearance of capillaries, incompetent circulation, cyanosis, and dilatation and hypertrophy of the right ventricle, with accentuation of the second pulmonary sound. When the upper right lobe is thoroughly affected, the heart may be drawn up and to the right; and the heart and the large blood vessels are more than normally uncovered, and accessible to percussion. That is why the diagnosis of hypertrophy of the heart should be asserted with some mental reservation, exactly as in the cases of rachitical deformity of the chest, when the flattened side of the narrowed thorax conveys the impression of a hypertrophied heart, merely because it is more extensively in contact with the chest wall. In a similar condition is the heart, when it is drawn to the left by the cirrhotic condition of the left lung. But there are more cases in which cirrhosis, being local, has no such severe result, and the described alterations are but partially developed. The majority of such patients live a fairly comfortable life; they breathe with less than their original lung area, that is all. Fortunately all of us have more than is absolutely

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required. In all of these cases, even the mildest, the heart sounds are transmitted to a great distance as they are in every form of solidification of the neighboring tissue.

Temperature.—It may be high in acute cases, and remain so for weeks; in them bronchial respiration may appear relatively early, and nutrition may suffer quite badly. In most instances high temperatures do not persist long. Week after week, with remissions in the morning, 101 or 102° F., may be reached in the afternoon. These are the cases in which in either an infectious fever, such as typhoid or tuberculosis, may be feared, or intestinal autoinfection, with its long duration, occasional erythema, frequent indicanuria, and toxic nephritis may be diagnosed. The latter is more easily eliminated than the former, *i.e.*, typhoid, in which the recognition of the bacilli is either uncertain or impossible. When the induration is fully established, there is no temperature. I know patients of this kind, who, with all their symptoms of local pulmonary cirrhosis, have not been aware of any disturbance these twenty-five years.

Deformities of the Chest are observed whenever the induration is sufficiently large. They are frequent because the patients are mostly infants and young children with flexible ribs. The apex is retracted, the upper anterior chest flattened. The ribs are close to one another; in Da Costa's experience, who evidently observed adults with complications, the deformity was most often seen over the lower lobes. The vertebræ may be more or less deviating, the scapula of the affected side lower and standing out from the ribs. The circumference of the diseased side is diminished. All this takes place in serious cases. When the upper lobe, the left, or mostly the right, is alone affected, the deformity is accordingly small.

TREATMENT.—The vast majority of cases begin and run their full course in infancy and early childhood. That cannot be repeated too often, for all our text-books refer to adults and to the unfavorable terminations of the disease; and some of the numberless pediatric text-books follow their lead in the most conscientious neglect of observable facts and in treating the young and small as mere miniatures of

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the old and big. That is why, if there be preventives, they should be resorted to in infancy and childhood. The best preventive against the diseases of the respiratory organs is protection against infections and against colds; that means strengthening of all the integuments, both mucous and epidermic, and mainly the cutaneous, and thereby the general circulation and its innervation. Good air, plenty of good food. A boy of twelve years should not work in a coal mine at four cents an hour, and the four cents withheld from him and his starving family on account of a debt contracted by his father who was killed in the same coal mine in the employment of the same company, in what we call a Christian country. It is not good for the boy. Perhaps you could convince the employers and the commonwealth of that fact, if more of you doctors would go "into politics." The best means of protecting the child against the influence of sudden exposures and changes of temperature is to get him used to cold water. Begin to wash the well baby when about a year old, after his warm bath, with water of 70, 65, 60 degrees and rub him well until he is dry and thoroughly warm. Diminish that temperature when he is older. Be guided by his strength and weight and previous habits in selecting the treatment. There was a gentleman who lately, before the Association of German Naturalists and Physicians, proved to his satisfaction that exposing children to cold water gives them adenoids and generally poor health. He gives you figures, too—60 cases, I believe—and figures prove everything to a person who knows how to handle them. In our houses and in our streets, infants and children are more exposed to draughts and the bad influences of infections and of registers, furnaces and sewer manholes than grown-up people. Cold draughts creep along the floors of the rooms, just as the dry and by no means unpolluted air of our furnaces, with its smoke and carbonic acid and sulphuric acid, is at the exact height of their noses. It is fortunate, however, that most of the virulent microbes swept into the sewers from dwellings and hospitals find their graves amongst the saprophytes of putrefaction.

The mention of hospitals reminds me of a preventive of

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a negative nature. Those of you who control babies' hospitals will do well to remove patients, as soon as the recovery from a disease for which they were admitted is accomplished. The communicability of lobar pneumonia from one bed to another is, I hope, an established fact; and the frequency of enteritis in every baby ward is a common source of pneumonia. It is true that the latter form, so caused, is almost exclusively lobular. But both the lobar and the lobular variety may give rise to interstitial complication. When this is once started, relapses are frequent, one may say almost certain. Besides, the baby in a hospital cannot have sufficient exercise. It is in its crib or on the floor, with insufficient muscular action and unstimulated circulation. Hypostasis, like ill nutrition, is the result.

Is there a way of fortifying anemic, purry, undersized and underweight infants and children, beyond attending to their hygiene? Their diet should not consist of un-mixed and unimproved cow's milk too long. Its tendency to produce dyspeptones and its lack of iron contributes to the development of rickets and of anemia. Animal food and cereals are indispensable.

Medicinally also, we may do a great deal. Our tissue builders are too often neglected. Arsenous acid, a milligram, more or less, daily may be given in small doses after meals, plentifully diluted, for months in succession; phosphorus acts in the same way and never gives rise, when administered medicinally, to any symptoms of poisoning. A baby of a year may take ten drops of the elixir of the pharmacopœia three times a day for three months in succession. Those children of five or seven years who do not thrive on that treatment and on food which contains iron enough, should be suspected of parasymphylis; their fathers' histories should be scanned and not too easily allowed the benefit of any doubt. For these children mercury, with or without iodides or iron, will often accomplish what diet and arsenic and phosphorus were unable to do. Quinin has not satisfied me. In fact dozens of years ago I gave it up in these cases as not fulfilling any rational indication. When the heart muscle is feeble,

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together with all the rest, those of you who believe in medicines as I do will find that the equivalent of a grain of digitalis given daily, for several months in succession, in refracted doses, will act very favorably on the myocardium of a baby a year old, and by improving circulation will nourish the heart and the rest of the body. Those of you who do not will do well to be converted.

When the disease is acute, subacute, independent or complicated, it requires attention to circulation and nutrition, rarely to temperature. It has appeared to me that frequent and protracted warm bathing, 95° to 90°, had a still better effect in this form than in any other. In other respects the dietetic and medicinal treatment is like that which you would employ in other varieties of pneumonia, with one exception. Do not forget that recent cell proliferation and the recently formed connective tissue are absorbable and should be met by treatment. Iodin should be given early; no matter whether you select or are compelled to select, the potassium or sodium salt, iodipin or hydriodic acid. We should not wait too long before beginning that treatment. Organized tissue, unless it be the result of secondary or tertiary syphilis, is no longer influenced by iodids. Treatment should be continued a long time, and may be intermitted and resumed. There may come a time for iodid of iron, when there is anemia and no longer any elevation of temperature.

Chronic dormant cases require gymnastics of the chest muscles, but only under the direction of a medical person who knows how to appreciate the possibilities of a strained heart and the danger of relapses. I am yet to see the owner of a professed gymnasium that knows enough or cares enough. I have seen plenty of cases recurring after over zealous gymnastic teaching. A crippled lung must not run in an Olympic race.

As in the cases I speak of—I repeat, the vast majority—there is no cough and no expectoration; there is no indication except the attention to the general health—good food and clothing, cold water, no overwork, outdoor life, an equable climate, for the stronger an altitude of from 1,200 to 2,500 feet, for the feeble the South, the Riviera

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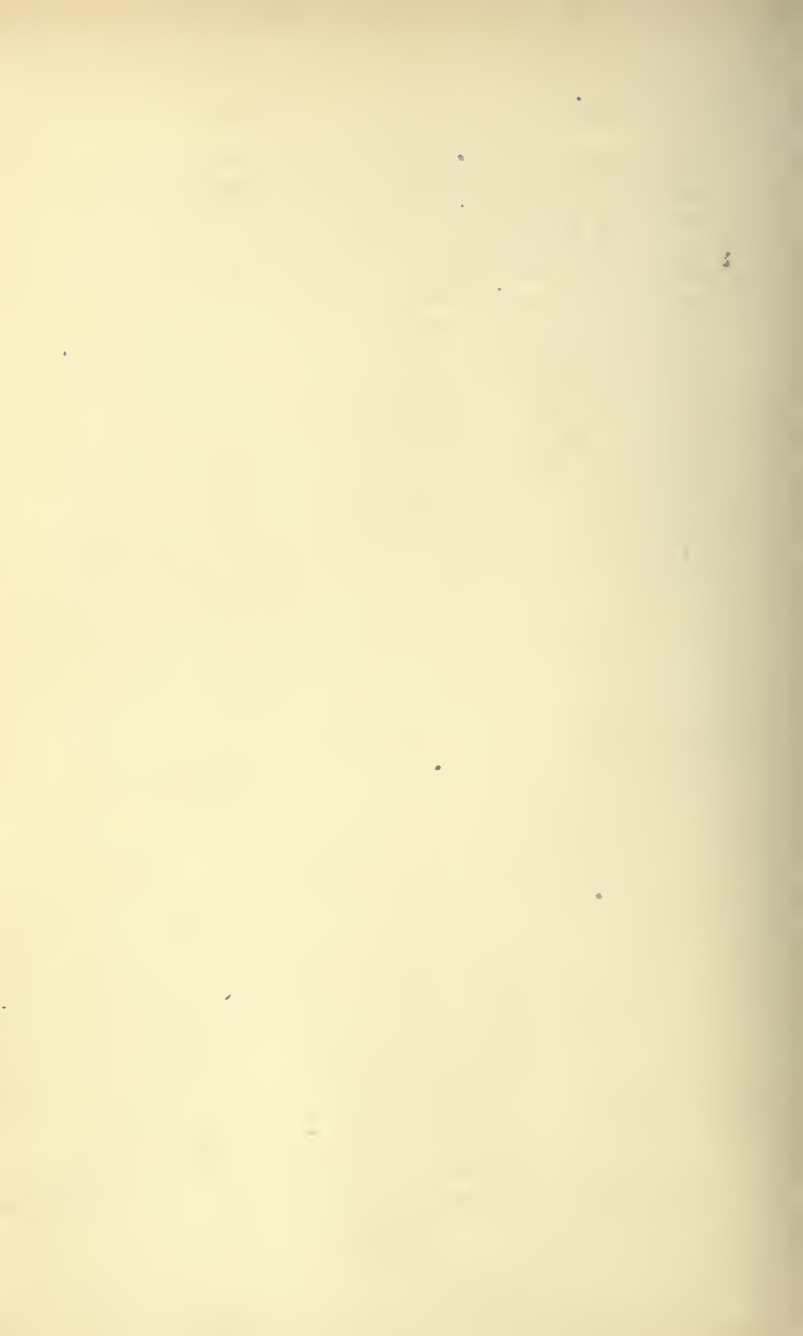
or Montreux, Cannes, or Tangier. That is, for those who can afford it. The poor will fare according to the state of civilization and the sense of responsibility prevalent in the commonwealth. Both are low. If the money strenuously squandered by this Republic on wars outside and frauds inside were spent on physical and mental schooling, in city improvements, on sanitation for the tubercular and the weaklings, on the saving of children condemned to subterranean labor, on the rebuilding of our murdered forests, there would be an eternal Christmas on earth, mankind nearer its destination, and this Republic the feast of the old continent's hungry eyes. There would at last be "glory to God in the highest, and on earth peace, and good will toward men." I repeat, ladies and gentlemen, it is time that more of you doctors and particularly you family physicians and pediatricists, should "go into politics."

In some young, in too many of the adult, the further development of peribronchitis and interstitial pneumonia may be that into emphysema, asthma, bronchiectasis, caseous degeneration, abscess, gangrene, cavities and death. These sad themes are elaborated in our text-books. Your Tyson, Anders, Osler and all the rest have instructive chapters on these subjects. It need not always be death even in what appears to belong to the worst cases. I discharged a few months ago a colored girl of four years that entered the hospital with the history of a long-continued interstitial and lobar pneumonia. She was admitted with fever, a big cavity in her right lung, constant cough and copious bloody, and purulent, extremely foul expectoration. The cavity was at a distance of more than 2 cm. from the chest wall, but so dense was the gray, hard pulmonary tissue, that after a resection of a rib I used the knife, not the cautery, to open the abscess cavity, and lost not more than 4 c.cm. of blood during the whole procedure. She was irrigated, treated with arsenic and iodids, and got well, with lung enough left to keep her comfortable under favorable circumstances.

In emphysema and asthma, in spite of the auscultatory difficulties, the differences in the amount of air entering

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the lungs and the slight changes of the percussion note discernible to a practiced ear, speak of previous interstitial inflammation, thickening or retraction as the case may be. These cases are frequently benefited by iodids, not alone on account of their influence on the heart and blood vessels, but also on account of their powers as absorbents.



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CASE I.—C., fruit business, forty-two years old, married; had one child which was stillborn. His father is alive, seventy-eight years old; his mother seventy-five. There are no other relatives except one sister, who is described as being perfectly normal, and one brother, whom I personally know. He appears fairly well developed physically, but has no whiskers, no hair on the pubes, none in the axilla, and the sexual organs are those of a child of ten years. Both of these persons have had pemphigus in the mouth all their lives.

Patient appears to be pretty well developed, his complexion, though, is sallow; all his internal organs are in fair condition. His urine has a specific gravity of from 1.018 to 1.025; is always negative. He has always complained of a sensation of fatigue. He tires very easily, drags his limbs; cohabitation, which occurs but once a month, exhausts him; his hands were always weak, and moderate exertion results in tremor. He has trouble in keeping warm, and complains a good deal of præcordial pain, both on pressure and before his meals. This pain, as he expresses himself, was never so bad as when, under the orders of

¹ While this paper was being put in print, Dr. O. Rosenbach published (*Deutsche med. Wochensch.*, June 28, 1894) a paper containing a "Contribution to the Vesiculating Affections of the Oral Mucous Membrane." Its conclusions are as follows: "The local pemphigus of the mucous membrane of the mouth is a variety of erythema exudativum multiforme, and ought to be called erythema bullosum. Whatever has been described as urticaria, herpes, etc., of the oral mucous membrane, is mostly this erythema bullosum. It is often complicated with the same eruption on the genital organs. It has a tendency to relapse."

The very variety of the symptoms, and the etiological identity evidenced in the histories of the cases, makes me believe that the name selected by me is more significant and appropriate.

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a physician, his diet was restricted. He has a melancholy temperament, and expresses now and then a number of hypochondriacal notions.

Up to his thirteenth year he suffered severely from urticaria. Since his thirteenth year this urticaria has disappeared, and has been replaced by pemphigus in the mouth. A few blisters will form quite suddenly, sometimes on the tongue, mostly on the cheek, frequently in their lower parts, near the alveolar processes. They will burst after a little while; whitish ulcers will remain quite a long time and give rise to a great deal of pain, sometimes resulting in sleeplessness. Half of his life time, since his thirteenth year, he has been troubled with this eruption, which would come on without any apparent cause. He states that half of this period he has been free, not being able to explain why he should have the eruption nor why he should have been free.

About ten years ago, after having been under treatment three years, he had no eruption during the course of three or four years. At that time, and in some later periods, the medicinal treatment consisted of the internal administration of atropia, arsenic, and ergot. He claims that no local treatment ever benefited him except the application of concentrated sulphuric acid. He says it was a notion of his own, and asserts that it heals the sores in a few days.

Once, when the patient was as willing as I had been long ago, I sent him to a neurologist of well-merited fame and sound judgment. What he replied was as follows: "I could not make out the cause of the ulcers in C.'s mouth. If it is not a state due to chronic indigestion, and yielding to it, there are two possibilities to consider—one, that he is an epileptic; that the sores are due to attacks in which he bites his cheeks and lips, and of which he is wholly unconscious; secondly, that a morbid tendency leads him to use various acids, etc., in his mouth (and this he admitted he did), which keep up the ulceration or reproduce it. He seemed to me a queer hypochondriacal person, and gave me such an indefinite history that I suspected some mental taint."

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CASE II.—Mrs. W., thirty-two years old, the oldest of five children in the family. Her father has a very irritable, choleric temperament; her mother is placid, a woman of character and intellect. Her oldest brother has always had a systolic heart murmur, without any hypertrophy, the cause of which can be referred only to an insufficient contraction of the heart muscle. He is now a man of twenty-eight. He has for the last six years had peculiar attacks (epileptic?), the principal symptoms of which are slight contraction of the sterno-cleido-mastoid, which turns his head to the right side; scintillation and semi-unconsciousness, which is sometimes complicated with slight delirium, temporary forgetfulness, and limitation of his field of vision on both sides. These attacks will sometimes come on every month, sometimes not in six months. They are frequently the result of sudden turning of his head in one direction, and upward.

Another brother had meningitis when three years old, with all the symptoms of a tubercular meningitis. The disease did not prove fatal, but from that time on the boy had a feeble intellect, amounting to stupidity; was a bad scholar at school; had an irritable, violent temper, amounting to moral insanity when quite young; became more violent when he grew up, and had finally to be confined in an asylum for the insane, where he has been these many years.

A sister of the patient has suffered from *petit mal* since childhood, and has feeble intellect, still she is married. A younger sister died when five years old, of convulsions during pneumonia.

Patient was always neurotic; dysmenorrhœa has accompanied her through life; she has been married six years, and has been pregnant four times. The first pregnancy resulted in abortion, the second in the birth of a boy who is four years old and suffers from dyspepsia and constipation. He is a very neurotic boy, cowardly, melancholic, and talks much of his health. The third and fourth pregnancies terminated in abortion.

The patient wore convex glasses, No. 12, twenty years ago; wears No. 6 at the present time. She suffers much

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from headaches, which do not appear to depend on the condition of her sight. Cephalalgia will come on mostly about the time of menstruation, which is irregular, sometimes scanty, sometimes copious, mostly behind time. Headache will also be produced by reading, thinking, and when the stomach is empty, also under the influence of anxiety or emotions in general. During her headaches she is pale; now and then, however, her forehead will be flushed. Her tendency to constipation will sometimes be interrupted by diarrhœa. Nausea is a frequent symptom; it is often complicated with vertigo. Her kidneys are normal, the urine now and then quite pale and of very low specific gravity.

Other neurotic symptoms are, frequent thirst, also nausea when she stoops and when at work over drawers. In such cases vomiting has been observed which lasted a whole day. Music will confuse her. In the stores she will sometimes forget what she wished to purchase. Occasionally she complains of neuralgic sensations all over the face in every direction. She sees sparks. Whatever she does she complains she does mechanically. She has "to think terribly much."

Whenever she has such attacks of nausea, of vertigo, and during dysmenorrhœa she has a sudden eruption of vesicles in her mouth of a size from a lentil to a pea, preceded by local redness. They burst very soon and leave behind them a sore surface of grayish-white color, which feels a little harder than the normal neighborhood, the hardness evidently depending on a fibrinous exudation into the surface. It takes many weeks before these sores heal. Fortunately they are never numerous. In a number of instances only one would appear. She has had these attacks very frequently since her thirteenth year. Menstruation did not show itself before the fourteenth. The only times when she has been permanently free were during pregnancy and during a trans-Atlantic voyage some four years ago and an absence of about six months.

CASE III.—W., stationer, thirty-one years old; never had eczema or other cutaneous diseases; never a chill; has regular bowels; boasts of general good health, and has a

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great many local and general complaints. He is a good sleeper, his organs appear to be healthy, his urine has a specific gravity of 1.023 and is negative. He smokes but little, but both cigarettes and pipes. Boasts of not being a nervous man. His mother, however, was "quite nervous," and an only sister died of œdema glottidis at the age of thirty-one years. He has been addicted to masturbation from early life until a few years ago. For two years has had attacks of palpitation which last three or four days, during which breathing is more or less difficult. His heart is of normal size, the sounds feeble; there is no murmur, no hypertrophy. He complains of his stomach, which has been bad three or four years; of slow digestion, and of attacks of vomiting some years ago. He eats rather fast, and takes alcoholic beverages from time to time. The gastric pain he complains of is in the median line. He has it mostly when the stomach is empty. The pain leaves him after eating and returns after an hour or two. His diet does not appear to influence this pain; as he expresses himself, he has pain after everything and is painless after everything.

When he presented himself in March, 1894, he gave the following history: During the last days of 1890 he was sleepless, from no apparent cause. He committed no indiscretion in his diet, but on the 1st of January, 1891, quite suddenly he had what he calls canker sores on his left cheek; blisters sprang up which opened soon and left a white surface which lasted weeks and gave him much pain. He says they travelled around the mouth on both sides, jumping over distances, and have not left him since with the exception of a few days about Thanksgiving Day in 1893. Until that time he had a large number of such blisters and ulcerations of the size of peas and less, rising from what appeared to be a normal surface, on lips and tongue, besides the cheeks. All at once, about Thanksgiving, 1893, he could again whistle and remained well a whole week. Then blisters would spring up again on the outside of the lips; the angles of the mouth cracked, and blisters appeared in the oral cavity, terminating in superficial excoriations. Since the 1st of December, 1893, when

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the new eruption sprang up, its character has somewhat changed. Besides the large pemphigus vesicles in his mouth, the outside of the lips has participated in the process. There the vesicles are smaller, and rise from a hyperæmic surface. The cheek will swell up now and then, and headaches are not of uncommon occurrence. On April 2d, he complained of a severe headache which had continued a week, and necessitated, and was eased by, prolonged sleep. This headache improved greatly since a few days previous to his call a frontal herpes showed itself. During that time his bowels and appetite had improved, but a symptom which had not been present before and staggered him much, was a very copious perspiration around his anus. On the 17th of May he reported this had disappeared; there was some pain on the right forehead; there was no pemphigus in his mouth, but a few pemphigus eruptions had appeared on the outside of his lips, which had lasted three weeks. He again makes the statement that he has not been free for a year with the exception of that one intermission in November, 1893.

Pemphigus has amongst its causes heredity and certain affections of the nervous system. Kaposi² reports the case of a man of twenty-two years who suffered from pemphigus since his childhood. His sister, his mother, her brother and half of the children of the latter were similarly affected.

In anomalies of the sexual organs, in pregnancy (Hebra, Bulkley), after confinement (Köbner), it has been observed; in lepra (Boeck, Nielen) it appears either as prodromus and may last for years, or it originates—both traumatically and spontaneously—on anæsthetic parts of the surface. The spinal cord has been found to be altered in chronic pemphigus; it is met with in chronic myelitis and in neuritis. But in all of these cases pemphigus was not found on the mucous membrane, as in those related by me, and the following:

Kopp³ describes a case of what he calls tropho-neurosis hysterica. It was that of a woman with a neurotic history

² A. Eulenburg: Real. Encycl., 2d ed., vol. xx, p. 291.

³ Trophoneurosen der Haut. Inaug. Diss., Würzburg, 1891.

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and hysterical attacks. Amongst other eruptions she had herpes on the lower lip over the right mental nerve, and after that a small vesicle over the middle of the upper lip. This was followed by a large vesicle on the left side of the lower lip and a stomatitis with frequent hysterical attacks. Both vesicles and stomatitis disappeared in five days. Later on there was marked pain in the gums and on the mucous membrane of the mouth, followed by herpetic vesicles on the lower lip and a marked stomatitis, with fetid breath and frequent hysterical attacks. A week later there came another crop of herpetic vesicles on the lower lip, and the same condition would repeat itself at longer or shorter intervals. During all these attacks the temperature was normal. Alongside the vesicles there went a desquamating catarrh of the mucous membrane of the mouth, which recurred frequently and suddenly. Some months afterward, with a recurrence of the hysterical attacks and other skin affections, there was again herpes on the lips as before, and a marked stomatitis.

T. S. Flatau publishes,⁴ under the head of chronic recurrent herpes of the oral cavity, the case of a merchant, thirty-eight years old, who was well until his eighteenth year. Then he had typhoid fever and became addicted to alcohol; it is thus that the neurotic element may be surmised to have come into the case. Some months after his convalescence from typhoid fever he had an herpetic eruption on the lower lip, which soon healed. Since that time he frequently had similar eruptions on the mucous membrane of the lips, on the gums, near the floor and roof of the mouth, occasionally also on the tongue, mostly along the free margin posteriorly. These crops would last from eight to twenty-eight days. The longest time that he was ever free was one year, being then also relieved of the general irritability of his nervous system. Then the eruptions reappeared, and since that time the intervals between them have continually grown shorter. It was also observed that when his nose was clear there was no eruption, and when the latter appeared the nose was obstructed. He never had neuralgic pains, but saliva-

⁴ Deutsche med. Wochenschr., 1891.

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tion frequently. Patient shows marked mental depression, which he explains by the fact of his suffering from his trouble through so long a period and his impossibility to master it by treatment. There is no syphilis, no tuberculosis, no malaria. The simultaneous appearance of nasal symptoms might suggest a causal influence of the latter, but it is quite as probable that the mucous membrane of the mouth and of the nose was affected at the same time. But there is no means of arriving at a correct diagnosis of the original condition. The assumption of a peripheral or central affection of the trigeminus is hypothetical.

B. Mandelstamm⁵ observed four cases of pemphigus of the mucous membrane of the mouth within ten years. In one of them the eruption was also seen part of the time on the skin. In all of them the treatment was unavailing. There was no systemic disturbance, but there was fetid breath and painful deglutition. Eruptions were found on the mucous membrane of the tongue, cheek, lips, and throat. The sores were of a size from a lentil to a cent. They were grayish-white or white. The patches had sharply defined borders. Some were thick, like a membrane, and could not be removed without leaving a bleeding surface. The eruptions, when on the tongue, were usually found on the free border of the inferior surface. Now and then they would appear on the epiglottis. Around the excoriations or membranes there was usually slight œdema, and salivation was not uncommon. Microscopic and bacteriological examinations were all negative.

The author has scanned the literature quite carefully, and comes to the conclusion that such cases must be very rare. A little more frequent are detachments of epithelium which remain membrane-like on the surface, and may resemble to a certain extent diphtheritic or croupous membranes.

With the exception of a few cases to be mentioned hereafter, the above cases of chronic pemphigus of the mouth appear to be all that have been observed. A few instances of pemphigus of the skin I now propose to mention briefly, and to accompany them with a very few remarks which

⁵ Berl. klin. Wochenschr., 1891.

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are meant to elucidate the peculiar etiology of the affection.

Kirchner's case⁶ was that of a man of fifty-four years, who was reported to have had a primary specific affection without, however, exhibiting secondary symptoms. For the past seven years he was frequently taken with pemphigus eruptions on arms, legs, face, and neck, accompanied with general systemic disturbance and sweating. Sudden exposures to cool air after perspiration were presumed to occasion the attacks. At the Ninth Congress⁷ of Internal Medicine a few cases of pemphigus were the subjects of discussion. Mosler claimed it as a vasomotor, Schwimmer as a trophoneurotic affection; as to its neurotic character there appeared to be no doubt. As the suspicion of its being of an infectious nature easily suggests itself, microbes were carefully looked for by Mosler, but not found. Nor was Landgraf more successful in this respect, in a case of chronic pemphigus of the conjunctivæ and the mucous membranes of the nose, fauces, and oral cavity.⁸ A similar case was reported by Boer⁹ and Chiari;¹⁰ it was observed in a coachman of sixty-three years, who developed pemphigus on the mucous membrane of the larynx. Tuberculosis was suspected, but the diagnosis was dropped when subsequently the same eruption showed itself on the throat and mouth. No attempt is made in the publication to diagnose the cause.

Mosler's case in a woman of thirty, of pemphigus of the skin of the trunk and extremities, was decidedly of a neurotic character, in a neurotic family. The patient was always of delicate health, and had repeated attacks of epistaxis, fainting, and epilepsy, from her twelfth to her fifteenth year; afterward she suffered from chlorosis, dysmenorrhœa, arthritis, hæmoptysis, and hæmatemesis.

Benedict observed pemphigus both after peripheral nerve lesions and central disturbances. So have Charcot, Leyden,

⁶ Archiv. f. Dermatol. u. Syph., Wien, 1892.

⁷ Verhandl., Wiesbaden, 1890, p. 252.

⁸ Archiv. f. Dermatol. u. Syph., 1890.

⁹ Berl. klin. Wochenschr., 1891.

¹⁰ Wiener klin. Wochenschr., 1893.

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and Eulenburg. Hebra quotes Dickson and Gilibert, who claim emotional excitement as amongst the causes of pemphigus, and admits the existence of a "pemphigus hystericus" which appears and disappears in combination with a series of hysterical symptoms. A unilateral case of the kind is reported by Pick (*Wiener med. Presse*, 1880).

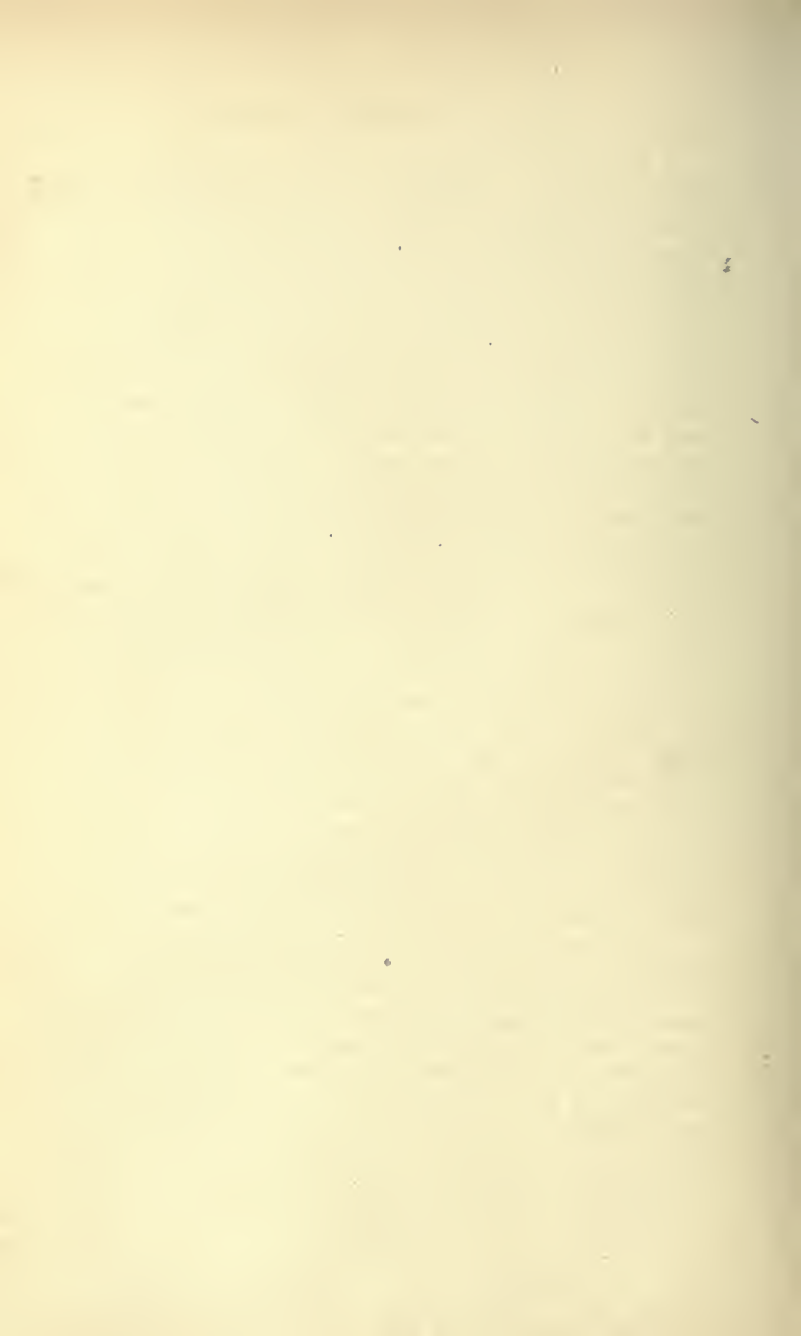
The majority of the neuroses of the integuments, which result either in a simple hyperæmia and œdematous tumefaction or in exudation reaching up to and into the epidermis, have been described as either urticaria or herpes. They are found on the skin almost exclusively. In severe generalized urticaria of the surface I have, however, repeatedly met with an œdematous swelling of the mucous membrane of the mouth; once I observed an acute laryngeal catarrh with croupous cough and dyspnœa, and once a very intense rectal tenesmus. Herpes febrilis I have seen quite often, when severe on lips and chin, to spread over tongue and cheeks, exhibiting the same character in all localities, and following the course of a peripheral branch of the trifacial nerve. As a rule, however, both urticaria and herpes are limited to the surface. Hemorrhages into the skin I have now and then found in exquisitely hysterical women. Pemphigus, as the literature of the subject proves, is but rare in that connection. Whenever found, it is on the skin almost exclusively, not on the mucous membrane. With the exception of the few cases given in detail, there are amongst the instances quoted above only those of Landgraf, Boer, and Chiari in which pemphigus was limited to the mucous membrane of the oral cavity.

Herpes is by no means rare; indeed, *acute herpes* ("zoster") is a frequent neurosis. Its form, however, is not always the same. In some eruptions of zoster the liquid exudation does not suffice for the formation of vesicles; in others the vesicles are very large, like those of pemphigus. These two varieties of dermatitis will sometimes resemble each other in many points. Mosler's case of cutaneous pemphigus began with small vesicles; within four or six hours they were of the size of pigeon's eggs. In one of my cases the pemphigus eruption was

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surrounded with a hyperæmic area, and that of Kopp's is of a similar nature. These instances prove the at least occasional presence of equal etiological and pathological conditions. Still, the great scarcity of pemphigus of the mucous membrane of the mouth appeared to me a sufficient reason both to describe my cases and to range them under a special heading. The neurotic character of my cases appeared to me self-evident. In two there is a positive family taint; in one the taint is but individual, but the neurosis finds its cause, amongst others, in masturbation, and exhibits a series of nerve anomalies. Even gastric symptoms, when they occurred in my cases, were easily recognized as neurotic. Other symptoms of the same nature were headaches, constipation, diarrhœa, nausea, local perspiration, and general neurasthenia. The temperature of the body was always normal. Contrary to what we see in herpes of the surface, which heals readily unless maltreated, pemphigus of the mouth is of long standing, and heals but slowly, and gives rise to a great deal of protracted pain and discomfort.

The marked family disposition which is evident in the history of two of my cases, reminds me strongly of what Carl Blumer has described under the heading of "hereditary disposition to vesiculation" (Prague, 1892). Valentin employed for the same affection the name of hereditary dermatitis bullosa; Köhner called it epidermolysis bullosa hereditaria; and Klebs, dysplasia vasorum. He found the blood vessels in a condition resembling that of hæmophilia; down to the capillaries they consisted pre-eminently of cells of embryonal structure, predisposing to hemorrhages and exudation. Some of the cases described by Blumer and others (Goldscheider, Valentin, Ferd. Hebra, and Köbner) were complicated with urticaria, swelling of the lymphatic vessels and lymph-bodies, tumefaction and redness of skin surrounding the vesicles, general malaise when eruptions were copious, hemorrhages into the vesicles, suppuration, and purpura.



HYPERTHERMY IN A MAN UP TO 148° F. (64.4° C.)

EXCESSIVE temperatures of the animal and human bodies have been studied both experimentally and clinically. Naunyn and Quincke (1869) crushed a dog's cord and found the normal temperature of 40° C. raised the next morning to 42.3°. Many observers found hyperthermy when bulbus and mesocephalon were hurt. Guyon (1893) noticed the temperature to rise to 12 times in 25 experiments, when the nucleus caudatus; 13 times in 26, when the optic thalamus; 10 times in 19, when the corpus callosum was injured. The inconstancy of such observations is the more striking the more we are told that whenever the increase amounted to 1° or 2° C. the stiletto was found to have touched the wall of a lateral ventricle.

According to H. C. Wood (*Fever: A Study in Morbid and Normal Physiology*. Smithsonian Institution, 1880, p. 254), the only nerve-centre proved to exist, capable of influencing the heat-production without affecting the general circulation, is situated in the pons or above it, and whilst it may be a muscular vasomotor centre, it is more probably an "inhibitory heat-centre." Of which ever nature it may be, it must act through subordinate centres situated in the spinal cord.

Clinically, high temperatures have been observed in lesions of the bulbo-cervical cord, in tetanic muscular contractions, in insolation, and in infectious diseases. As early as 1837 Brodie met in fracture of the spine over the cervical cord with 43.9°, Billroth with 42.2°, Simon with 44°, Frerichs with 43.8° (Hermann's *Handb. d. Physiol.*, iv., 2, p. 436). Ch. Richet publishes (*La Chaleur Animale*, Paris, 1889) a collection of high temperatures with their results; there were 6 traumatisms of the nervous system, with a temperature of 42.2°-43.9°, all of which died; 19

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convulsive diseases with 42° - 44.75° , with as many deaths; 6 sunstrokes of 42.7° - 44° C., 2 of which recovered. One of these is a case of Atzembach's at 43.6° C., the other of Seguin's at 42.8° , both recorded by the latter (*Thermometry*, 1864). In Richet's list of infectious diseases we notice intermittens with 44° C. observed by Alvarenga and Hirtz, and exceptional cases of scarlatina at 42° , which did not die. The latter observation I have personally made a few times in forty years.

The death-limit appears to be from 4° to 5° C. above the normal, no matter whether the excessive temperature is the result of pathological processes or of experiments. Most of the latter consisted in exposing animals to dry or humid heat, the latter of which is more fatal. Mammifera die at 44° - 45° (but few dogs ever survived at 45 , 40°), birds (with a normal temperature of 45° C.) at 48° or 50° , fish at 37° or 39° . The cause of death is coagulation of the muscular fibre of the left ventricle, and the post-mortem appearances are: Pleural, subpericardial, and pulmonary hemorrhages; congestion of all viscera and a contracted and empty left ventricle.

These observations on temperature elevations do not compare, however, with a small number of such as furnish the most striking surprises to the observer for two reasons: 1. For their heights; 2. For their relative innocuousness.

Dr. G. N. Philipson (*Lancet*, April 24, 1880) has the following case: A female, domestic, aged twenty-three years; had a hard life, rheumatic fever three years before admission, indulged in narcotics, spirits of camphor, cologne, in fact, anything alcoholic, and chlorodyne for a change; was in bed three weeks during 1877 because of pain and fainting spells; was sensitive, excitable, and had intestinal and muscular neuralgia, also amenorrhœa, and suffered from a dry, hot skin, alternating with profuse perspiration. She was admitted July 4th, 1879.

July 7th. P. M., 101° F.

9th. P. M., 112° .

10th. A. M., 112° .

11th. P. M., 101° .

Through three days she had 101° - 103° .

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On the 16th, P. M., 111°.

18th. A. M., 100°; P. M., 112°.

24th. Left axilla 117°; right 110°; mouth 102°.

During all these temperatures both pulse and respiration were changed. She had to be discharged, not being well yet, but was known to look well in September.

The *Med. Times and Gaz.*, April 24 and May 1, 1880, contains the following case of Dr. James Little: A woman, aged twenty-three years, fell on her head, and developed cerebro-spinal symptoms. Getting well she had the following week a normal temperature. Then suddenly, on April 19th, her axilla temperature was 115°. Defervescence was rapid. The same temperature was noticed 5 A. M. the following day; a few hours afterward temperature was 99.4°; on the evening of the 26th, 125.6°. In her case the high temperatures were ushered in with a severe headache, and terminated in profuse perspiration.

Dr. Graham Steele publishes (*Lancet*, 1879, p. 271) the case of a female, hysterical, with a temperature of 116.4°.

Mr. John W. Teale (*Lancet*, March 6th, 1875, and *Brit. Med. Journ.*, January 24th, 1880) reported a case in February, 1875, before the Clinical Society of London. A lady fell from her horse and suffered from serious spinal injuries. For sixty days she had a temperature of 108° to 122° and more, and finally recovered. The measurements were taken with the greatest of care, while awake or asleep, during day and night, under the arm and in the rectum.

Dr. Horatio Donkin has the case of a female nurse, aged nineteen years (*Lancet*, 1878, p. 678; March 15th, 1879; *Brit. Med. Journ.*, December 20th, 1879), who, in an enteric fever, developed a temperature of 111°. These temperatures were not persistent; indeed, changes set in very rapidly. Her pulse and respiration never changed much from their normal relation of 4.5:1; her mind was not clouded, she was simply hysterical, and complained of pain mostly on her left side. The temperatures were taken with the greatest of care, with several thermometers, and under the eyes of several observers.

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In the same paper (*Brit. Med. Journ.*, October 20th, 1879) Dr. Donkin refers to previous cases, either published or unpublished. Dr. Greig Smith (*Lancet*, March 15th, 1879) has the case of a girl, aged nineteen years, emotional, and with ovarian tenderness and frequent flashes, exhibiting temperatures of from 108° to 104° , with sudden changes—within ten minutes—down to 99° . Dr. Ormerod (*Lancet*, November 9th, 1878) relates the case of a woman, aged thirty-two years, emotional, hyperæsthetic, excitable, with a temperature of 115.2° .

Mr. J. Cæsar (*Lancet*, June 14th, 1879) has the case of a girl, aged fifteen years, who during an attack of enteric fever with double pneumonia exhibited a temperature of 113.1° , during which she was unconscious. An oral communication of Dr. Cheadle to Dr. Donkin refers to a girl, aged eighteen years, who, a month after an enteric fever, showed a temperature of 111° ; one of Mr. Davis to a man, aged thirty-four years, who had a synovitis of the knee and was treated with the actual cautery. He had very severe pain and a temperature of 112° , and another time of 110.4° , which fell to 100° within twenty-five minutes.

There is finally an oral communication to Dr. Donkin by Dr. Roddick, of Montreal, referring to a temperature of 117° , and probably more (the thermometer registered only that temperature).

In all of these cases the high temperatures did not exhaust the patients; perhaps, because in several instances it was found that they changed rapidly, and were not equally distributed over the whole body. Even as early an observer as Wunderlich has noticed the localization and inequality of temperatures.

Dr. Stephen MacKenzie reported before the Clinical Society of London (*Lancet*, November 5th, 1881) the case of a woman, aged forty-two years, observed by Mr. Rivington and himself, with temperatures of 108° - 112° , which disappeared after some dead bone had been removed. He believes, however, that these temperatures were fraudulent, suspecting the woman, who was hysterical and tricky. But Mr. W. H. C. Newnham (*Lancet*, November 19th, 1881), in a letter to the editor, writes that he was medical

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ward-clerk at the time and on two occasions he "took evening temperatures of 109° and 111° in the left axilla. He was sitting on the bed holding the thermometer, with fingers in the axilla and with the other hand holding the patient's arm, so that there was not the slightest amount of friction."

These cases are referred to in a careful and elaborate paper published by J. H. Bryant, M.D., in *Guy's Hospital Reports*, vol. 1., London, 1894, on "One Hundred Cases of Hyperpyrexia." The author adds a few more (p. 432), some of which he does not appear to believe to be above suspicion.¹

In a correspondence published in the *Memphis Medical Monthly* of October, 1891, Dr. Heber Jones sums up his case of hyperpyrexia (highest temperature observed 157° F.—observations frequently interrupted by the bursting of thermometers and the impossibility of quickly procuring others with high enough registers—actual temperatures taken 138°, 150°, 157° F., with rapid changes, May 4th, exhibiting at 4 P. M., 138° F., at 6 P. M. 152°, at 7 P. M. 98°) in the following words:

"Patient, a remarkably bright girl of fifteen summers, not of a nervous temperament, having menstruated perfectly normally for more than eighteen months, having enjoyed average health all of her life, began with a tonsillitis which was never severe, and lasted only about a week, developed without any known cause this extraordinary range of temperature, which lasted about six weeks, having had from one to three paroxysms each day, the paroxysms lasting at first about three hours, and gradually growing shorter, until toward the last the temperature went from normal to the top of a Hick's thermometer in a few minutes, and declined to 96° in almost an equally short time. During the paroxysms the subjective symptoms were

¹ He also quotes the Journal of the American Medical Association of March 21, 1891, which contains the report of a case—female—by Dr. W. J. Galbraith, in which the doctor registered a temperature of 151° F., the nurse one of 171°. I am credibly informed, by high authority, that the woman afterward admitted of shamming and fraud.

intense: coldness, requiring half a dozen blankets, bags of hot water, etc., nausea, and at times vomiting. She also complained of 'numbness,' beginning in the face and extending to the body. The objective signs were pallor and lividity of face and extremities, these appearing cold, and the body warm, but not hot. The tongue was generally coated, but rarely dry. The pulse never ran over 120, and generally under 100. The urine was normal, examined both chemically and microscopically, and nothing worthy of note found. Digestion impaired, bowels inclined to constipation, but no serious trouble; menstruated normally during the attack. At times, some tenderness in splenic and hepatic regions. At one time developed considerable tenderness in right iliac and along the ascending colon—lasted about a week. Convalescence rapid, and she has since enjoyed perfect health, but recently has had an intermittent fever of rather mild type, and has developed no unusual symptoms."

Dr. Jones was called April 12th, and noticed the first high temperature on April 16th (109° F.), the last May 30th. During the tests a large number of thermometers were broken, owing to rapid expansion of the mercury. It is unnecessary, but still just, to add that Dr. Heber Jones' standing as a medical man and a gentleman is of the very highest in his community, and that a dozen physicians and nurses were observers to the facts narrated.

Mr. Alfred Stanley publishes (*British Medical Journal*, May 25th, 1895) the case of a lady of thirty years, whom he was called to see on February 12th. He found a pleuropneumonia of the base of the left lung. Temperature at 10 A. M. 102°, at 1 P. M. 110°, at 2.30 P. M. 114°. Thirty grains of antipyrin were given. Temperatures at 5 P. M. 104°; on the 13th and 14th, 99°-100°; on the morning of the 15th again 114°; since which time she had an undisturbed recovery. During the high temperature the pulse remained at from 84 to 96. There was no pain and no delirium, but she complained during the heat of loss of sensation in hands and feet. Hot poultices were complained of as being too cold.

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In regard to the English cases published up to 1889, Richet (*Chaleur Animale*, p. 110) says:

"Teale and MacKenzie express the opinion that there is no possibility of a fraud in their observations. Still, though one ought to be slow in denying, we do not feel justified in admitting temperatures in excess of 46° C. (114.8° F.) to be true. We do not say they cannot be observed; but hitherto there has not been any authentic and unimpeachable observations. It is to be feared that the confidence of Teale, MacKenzie and Brine has been deceived. It seems this sort of fraud is quite a special habit of certain English patients, and until either on men or women most rigorously watched, temperatures of more than 46° C. will have been noticed we shall not be able to accept them as true."

To the list of the gentlemen named by Richet I add Donkin. They do not "express an opinion that there is no possibility of a fraud in their observations," they prove it. Different thermometers were used, in different localities of the body, day and night, during waking and sleeping by different observers, in the presence of others. In the face of these facts, verified as they are by the positive and circumstantial statements of the observers, it does not appear justified on the part of Charles Richet, high as he is, or because he is, in the esteem of the medical world, to add the slurring remark: "It is important to eliminate some temperatures reported in English journals, which seem to be the results of error or fraud." I am afraid the following case will shock his skepticism more than the rest. Its history has been carefully taken by Dr. J. A. Bullinger, the house-physician of the German Hospital, New York, whose indefatigable and painstaking services I take great pleasure in here acknowledging. But for the constant watchfulness of that gentleman, the following notes would not have been so full and explicit:

Aug. Fred. Franz H., of Magdeburg, Germany, fireman, aged twenty-nine years, was admitted to the German Hospital, New York, January 5, 1893, and ran away at 4 A. M., March 13th.

History.—Family history negative; patient himself

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claims never to have been ill. On October 26, 1892, while employed on Steamer "Heligoland," plying between Hamburg and New York, and at work on top of a walking-beam of an engine in motion during a storm at sea, he was thrown, and fell between two massive iron rods revolving in opposite directions. When picked up he was found unconscious, and remained so for about four days. He was told afterward that immediately after the fall blood escaped through his mouth and nose. When he regained consciousness he felt pain in his left lower thoracic region, was short of breath, coughed now and then, and threw up small pieces of dark, coagulated blood. Pain increased by deep inspiration and on coughing. Patient claims to have lost consciousness several times subsequently and was kept in bed and constantly watched by sailors while at sea. Spitting of blood and cough continued, but decreased in frequency. Several days later, when the steamer arrived in port, he was put ashore and told to go to a hospital; feeling well enough, he walked to the Long Island College Hospital, where he was admitted on October 11, 1892; he ran away on October 14th.

To-day he complains of slight pain in his head and in the lower part of chest. Admits three attacks of *gonorrhœa*; denies having had syphilis. His history appears to be that of a fairly healthy and muscular, but nervous, moody, excitable, and sometimes violent man.

Present Conditions.—A well-nourished and very well-developed muscular man. On anterior surface of his left forearm there are three comparatively recent scars about two inches long, which resulted from cuts received during a personal encounter about six weeks ago. An open wound is found at about the middle of the outer side of the left arm, one-half inch in diameter, in a neglected condition and discharging pus. On the right side of the anterior chest wall two inches below the clavicle there is a similar wound, surrounded by an inflamed and elevated area about two inches in diameter. It discharges pus, and pressure on the inflamed area shows an increased discharge. Patient claimed that these two wounds were the result of hypodermic injections made by the captain of the vessel

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while the patient was unconscious. There are no other marks of violence on the body. Pressure over the eighth and ninth ribs in the axillary line is painful; also pressure upward in the left hypochondriac region. Pain is not localized on palpating ribs and crepitus cannot be obtained. Inguinal glands on both sides are enlarged, but not tender. Cervical cubital, and axillary glands also slightly enlarged. No marks of pigmentation are found on the body. Expectoration consists of mucus mixed with small pieces of dark, coagulated blood.

Apex-beat in fifth intercostal space to the inner side of nipple-line. Cardiac dulness not increased. Auscultation negative. Lungs, liver, spleen, and abdominal organs generally negative.

Jan. 6th.—During the night the patient was found unconscious. Pricking with a pin, pressure, or pinching anywhere did not cause any response. Corneal reflexes abolished. Skin not reddened and does not differ in any way from the normal. Breathing very shallow and accelerated at times, up to 42 per minute; diaphragmatic breathing then seems to be suspended. At times the breathing becomes more deep and less frequent, 18 per minute; diaphragmatic breathing sets in again. Pulse full and strong and perfectly regular. Pupils contracted. Muscular system entirely relaxed. This unconsciousness lasted from about 1 A. M. until 6, when patient awoke, apparently none the worse for the occurrence. Temperature during unconsciousness was not taken, but at 6 A. M. was 99.4°. Patient complains to-day of an indistinct headache, not localized. Appetite good. No sensory or motor disturbances during the day. Ordination: calomel 1.0.

7th. At about 8 o'clock last night the patient passed into another stupor, with symptoms similar to those recorded the night before. Respiration was slow, ranging below 15 per minute, breathing being thoracic and abdominal; inspirations deep and full. Unconsciousness complete; no response to irritation anywhere. Pulse varied in frequency between 75 and 80. Temperature rose to 102.5° at midnight; at 4 A. M. 99.0°. A little before 4 A. M. patient recovered consciousness and at first appeared

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somewhat dazed, asking where he was and what had happened to him during the night. When spoken to, he answers rationally, but it seemed to take him a little while to connect his thoughts and to understand why he is in a hospital. Yesterday, during the day, the spitting of dark coagulated masses of blood continued, while to-day it has diminished somewhat. Patient coughs but little, and no longer complains of pain in his side. Lungs present nothing abnormal. Bowels have moved during the night and to-day. Headache still continues. Ordination: Leeches to septum nasi and both mastoid processes. Potass. iod. 0.5 every two hours. About an hour before the application of the leeches patient became unconscious. Nothing irregular was noticed in his breathing. Pulse still full and strong and perfectly regular. Pupils contracted and did not react readily. The application of the leeches does not disturb the patient, nor does a small incision enlarging wound in chest wall, nor the scraping of both suppurating wounds in chest wall and left arm; this is followed by the application of moist dressings (sublimat 1:3000).

8th. Patient slept last night from 9 P. M. until 4 A. M., then passed into a stupor, waking at about 7 A. M. After that, with the exception of a severe headache, the patient felt fairly well. No change in temperature, pulse, or respiration. Pupils contracted.

9th. At 8 P. M., yesterday, patient had a general convulsion, during which frothy and bloody mucus came from his mouth. Mouth was tightly closed. Upper extremities seemed more active than the lower. Conjunctival reflexes were abolished. Convulsion lasted for several minutes, and after it patient fell into a stupor, during which muscular twitchings were observed. Twitchings at times general and sometimes confined to groups of muscles. Upper extremities and face seem to be involved more than the rest of the body. Pupils contracted and equal. Jaws are firmly closed. Breathing shallow and through the nose. No cyanosis. Face flushed. Skin in general normal. No perspiration. Extremities, when not in a state of spasm, are entirely relaxed, so that when raised from the bed

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they drop back as if paralyzed. Temperature below 100°. Pulse perfectly regular, full and strong. Respiration not over 30. Duration of the stupor about four hours; is dazed on awakening and asks for water and food. After drinking several cups of milk sleeps the rest of the night. To-day he has considerable pain in the back of the head and feels more feeble than before. Appetite fairly good.

10th. No convulsion during the night, but unconsciousness and muscular twitchings same as before. Complains to-day of pain over middle of anterior surface of the left leg, which presents an irregularity about an inch and a half long, slightly inflamed and tender on pressure. Expectoration of bloody mucus has now entirely ceased. No abnormal physical signs in the lungs. No longer coughs. Bowels move regularly. No bladder-symptoms.

11th. Slight convulsion last night, in which the lower extremities did not seem to take part. After the convulsion he had several attacks of muscular twitchings during the stupor, which lasted about two hours. Then went to sleep until 4 A. M. Appetite fairly good. Headache continued during the day. Pupils equally contracted, and react but little to light.

12th. No convulsion. Some muscular twitchings, mostly of the upper extremities, during a stupor lasting several hours. Jaws were tightly closed for a considerable length of time. Awake during the rest of the night. Headache marked. Slept several hours during the day. Urine: no albumin and no sugar.

13th. No change in symptoms. Temperature 100° and below. Pulse good and strong. Respiration shallow during a paroxysm, becoming deeper and fuller now and then. Pain over the anterior border of the left tibia continues. Ordination: Inunctions ungt. hydrarg. 4.0 pro die.

14th. No change. Nor is there anything very marked up to January 26th.

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
Jan. 26	8 A.M.	96	99°	..	Patient quiet from 6 A. M. to 12.45 P. M. Then short attack of spasmodic contractions, which were repeated at 1.45 P. M. Slept until 3.30 P. M.

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Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
	3.45 P.M.	Slight chill followed by spasmodic contractions and fainting-spell. Pulse regular. Respiration irregular. Trembling of upper and lower extremities toward end of attack.
	4	92	111	..	
	4.20	88	106.4	..	
	8	88	107.5	..	
	10	..	..	..	Chill followed by spasmodic contractions and fainting-spell. Pulse regular. Respiration irregular.
	11.30	80	112.2	..	Similar attack.
	12 M.	84	104	..	
27	2 A.M.	..	..	..	Similar attack.
	3	..	..	..	Similar attack.
	4	84	104.4	..	
	5.30	..	..	..	Similar attack. Expecto- rates blood.
	6	..	..	..	Similar attack. Expecto- rates blood.
	8	86	104.6	..	
	11	..	102.2	..	During forenoon several slight attacks of spasmodic contractions and fainting-spells.
	3.30 P.M.	..	109.2°	..	Chill followed by perspiration.
	5.	..	109.4	..	From 4.30 to 5.30 P. M. marked attacks of spasmodic contractions. From 6 to 7 P. M. patient is quiet and feels languid and weary.
	8	80	101	16	At 7.30, also 8 P. M., chill and spasmodic contractions. Respiration irregular. Trembling of upper and lower extremities. Could not speak one-half hour.
	9	..	..	..	Similar attack.
	10	92	100.6	16	
	10.30	..	..	..	Chill, and similar attack.
28	12 M.	88	103	20	
	2 A.M.	92	109	20	
	3	..	..	..	Chill, spasmodic contractions, perspiration.
	4	88	104	20	
	6	84	103.3	16	
	7.45	..	..	..	Fainting-spell, spasmodic contractions, and expectoration of blood, followed by a chill.
	8	86	112	..	
	8.05	..	108.4	..	
	10	..	102	..	Feels very well. Took nourishment and slept from 12 M. to 1.30 P. M.
	2 P.M.	86	104.2	12	
	4	..	104	..	From 3.30 to 3.35 P. M. slight spasmodic contractions and fainting-spell.

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Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
	8	80	107.6	16	
	10	92	110.5	12	
	10.30	Chill followed by spasmodic contractions and marked perspiration.
	11	92	106	..	
29	1.30 A.M.	..	..	..	Patient complains of pains in the back and buzzing in ears; has palpitation, is restless, and expresses fear.
	2	96	112	12	
	3.30	..	..	..	Marked spasmodic contractions and twitching of the extremities. Groaning. Voice hoarse. Pulse weak and irregular. Cold perspiration.
	4	96	99.8	..	Spasmodic contractions, during which he loses control of tongue and lower jaw. Could not see for half an hour.
	6	92	112	9	
	8	82	107.2	..	Could not speak or swallow and was not able to move his tongue, which was very dry.
	11	86	104	..	
	1.10 P.M.	..	..	..	Begins to speak and swallow.
	2	..	102.4	..	
	4	84	106.8	..	From 4.30 to 5.30 P. M. slept.
	8	80	102.8	16	Slept until 8 P. M. Complains of pain in the back.
	11	72	99.5	12	
30	1 A.M.	..	..	..	Choking-spell; becomes cyanotic and expectorates blood.
	1.40	52	..	52	Right eye counts fingers at four inches; cannot see with left. Hears well with right ear, not at all with left. Tongue not movable and not sensitive to the needle. Lower jaw fixed. Has two attacks in which the diaphragm is fixed, no respiratory movements can be seen, and he becomes almost black. Then diaphragmatic respiration 52 to the minute. Pulse regular (52), small.
	1.45	..	..	..	Diaphragm fixed again; uses accessory muscles of respiration, and requests that his arms be elevated, as he can breathe better then.
	2.15	..	..	..	Crying-spell.
	2.30	84	106.2°	28	
	4	80	106.6	16	
	6	84	112	12	
	6.15	..	..	..	Choking-spell. Loses voice and control of tongue and lower jaw.
	8	88	105.4	62	Similar attack; four min-

DR. JACOBI'S WORKS

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
					utes later extremely pale. Pulse weak. Respiration 8. Arms elevated. Unconscious eight minutes.
11		80	104.4	20	
12.35		Choking-spell. Momentary tonic spasm. Transient dyspnoea. Conjunctival reflex normal.
2 P.M.		74	104.7	..	Patient quiet. Jaw rigid. Mouth half open; tongue not movable and not sensitive to touch. Same insensibility of the gums, uvula, and other soft parts of the mouth. Water poured into the mouth with the patient on his back does not cause attempts at swallowing, but occasions coughing and interferes with respiration. Complains that his eyes are very sensitive to the light. Bed is enclosed with dark screens, which relieves him. The noise of opening an adjacent window, the rustling of paper, footsteps, etc., agitate him very much.
4.10		Attack of spasmodic contractions. No apparent breathing for four minutes. Marked cyanosis, struggles for air; difficult to keep him in bed. Pulse is strong and regular. Marked perspiration. Same bulbar symptoms as before. Mouth open, lower jaw rigid.
4.25		On inhaling a few drops of chloroform diaphragmatic breathing re-established, cyanosis relieved, and speech returns. Noises in the street, such as passing vehicles, or whispering near the bed, cause the patient to start suddenly; cries, screams, and puts his hands to his ears, and requests that they be plugged with cotton. Chloroform is given until relaxation is complete. The patient sleeps. Respiration regular.
8		80	99.2	16	Pupils are smaller.
10		84	..	20	Sleeps until 2.15 A. M.
31 2.15 A.M.		96	106.9	20	On awakening, hungry and thirsty; drinks contents of three siphons in two hours.
5.30		Complains of pain in the side; has difficulty in breathing; an attack of spasmodic contractions; cyanotic and very restless.

HYPERTHERMY UP TO 148°

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
	6	96	108	16	
	7	..	..	..	Patient feels very well; laughs and talks constantly.
	8	82	104.5	18	Indulging in poetry about his wife.
	9	82	106.3	18	
	11	82	99.4	16	Sleeps from 9.30 A. M. until awakened by noise at 12.15 P. M. Then has a choking-spell; diaphragm fixed, arms elevated.
	2 P.M.	80	103.1	21	
	2.15	80	105.4°	20	Chill followed by spasmodic contractions; tongue and jaw fixed, eyes elevated and fixed. Apathetic. Twitching in the left cheek. Lower lip drawn to the left for a few minutes. Slight clonic contractions over the whole body, followed by a tonic contraction. Slight trembling of the right hand.
	2.50	..	..	..	Whole body is rigid; respiration interrupted. Patient grinds his teeth.
	3	..	..	..	Spasmodic contractions; cyanosis; dyspnœa; difficult to keep him in bed.
	3.15	80	106	20	
	3.25	..	..	..	Begins to talk.
	7.30	..	..	..	Having been asleep, awakens with a start and points to the ceiling, but nothing can be seen there.
	11.30	..	..	..	During sleep marked perspiration.
Feb.	1 12.15 A.M.	72	108	16	Complains of pain in the back and back of head.
	1	..	..	..	Spasmodic contractions for five minutes.
	1.30	..	..	..	Cyanosis; dyspnœa; difficult to keep him in bed. Mouth and eyes closed. Tongue and lower jaw not movable.
	4	72	112	16	
	4.40	..	..	..	Dyspnœa, pain in back. Delirium.
	5	72	..	60	Spasmodic contractions for ten minutes. Pale. Eyes open and rolling slightly. Pulse (72) regular. Respiration 60. Diaphragm fixed. Requests arms elevated to facilitate breathing.
	8	70	107.4	22	
	8.45	..	..	..	Spasmodic contractions ten minutes.
	9.15	..	99.2	..	
	10.40	68	..	48	Spasmodic contractions. Utters inarticulate sounds. Eyes turned. Twitching of hands and feet, lower jaw, and muscles of the neck.
	11	68	105.4	20	Rises, but falls down ex-

DR. JACOBI'S WORKS

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
					hausted. Complains of pain in the middle of abdomen.
	11.20	..	..	..	Spasmodic contractions. Cyanosis. Sits up and throws his arms about him. Is conscious and hungry. Choking-spell.
	11.50	..	..	..	Can speak again.
	2 P.M.	68	104.3	12	
	3.10	68	107.5	20	Chill and fainting-spell.
	5	70	107.1	12	
	6.30	..	..	..	Spasmodic contractions. Diaphragm fixed.
	7.45	..	..	..	Spasmodic contractions. Twitching of the upper extremities. Pupils small. Pulse regular.
	10.	..	..	..	Similar attack.
	10.30	..	..	..	Spasmodic contractions twenty minutes. Twitching of extremities. Eyes turned. Speech lost.
2	12 M.	72	112	20	
	1.50 A.M.	..	..	..	Choking-spell. Cyanosis. Trembling of extremities. Respiration irregular. Pulse regular.
	2	96	110	20	
	2.30	..	..	..	Spasmodic contractions. Expresses fear. No apparent respiration. Diaphragm fixed. Active delirium; wishes to get out of bed.
	3	80	112°	16	
	4.30	72	112	10	
	4.45	..	..	..	Spasmodic contractions.
	8	70	99	21	Feels weak and complains of pain.
	11	72	108.1	22	Slept all day.
	8 P.M.	64	112	20	Spasmodic contractions. Mouth and eyes closed. Trembling of the whole body.
	10	64	111.4	20	
	12 M.	72	105.3	16	
3	1 A.M.	..	..	..	Slept from 8.15 P. M. until 1 A. M. Fainting-spell for five minutes; lost speech.
	3.30	..	..	..	Same attack. Delirium.
	6	80	103.6	16	Pulse regular. Marked perspiration. Asleep.
	8	70	102.8	20	
	12 M.	64	103.6	21	An attack. Otherwise quiet all day.
	4 P.M.	68	103.4	20	
	10.15	..	..	..	Spasmodic contractions. Respiration irregular. Pulse regular. Dyspnoea. Bled from mouth. Twenty minutes later could talk.
4	..	..	..	..	Slept until 4.30 A. M.
	4.54 A.M.	..	..	..	Spasmodic contractions. Eyes turned. Twitchings of the extremities. Pulse regular. Pain in back and back of the head. Tongue swollen.

HYPERTHERMY UP TO 148°

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
	6.30	..	..	..	Fainting-spell.
	10	..	..	..	Transferred to isolated ward.
	10.15	..	..	..	Attack. Cyanosis. Trismus. Throwing hands and feet. Duration fifteen minutes, then conscious. Loss of voice twenty minutes.
	12 M.	..	103.8	..	
	3 P.M.	76	99.8	16	Sleeping well.
	7	76	102.8	16	Sleeping well.
5	2 A.M.	69	102.8	16	Pulse irregular. Sleeping well.
	8	82	99.5	14	
	10	70	99.6	17	Pulse strong, but irregular.
	12 M.	82	99.6	16	Pulse regular.
	2 P.M.	75	99.8	15	Pulse good.
	4	76	100	17	Pulse good.
	6	78	99.8	17	Pulse good.
	8	74	99.6	14	Pulse good.
	12 P.M.	60	99	16	Pulse irregular. Marked perspiration of head and lower extremities; body is dry.
6	5 A.M.	70	100	16	Patient feels languid.
	8	82	104.2	14	Pulse irregular.
	10	76	104.2	18	Pulse more regular.
	12 M.	76	108.2	18	Pulse more regular. Perspiration lower part of body.
	2 P.M.	80	100.5	16	Pulse more regular.
	4	75-80	108.2	12-18	Attack. Forehead, chest, and lower extremities cold: arms perspiring. Apparent loss of speech. Convergent strabismus. Complaints of pain in spine, neck, temples, and jaw.
	6	72	103.2	14	
	8	75	102.8	16	Sleeps well.
7	1 A.M.	67	106	14	Pulse regular. Sleep restless.
	4	78	107.8	17	Marked perspiration all night. Pulse regular.
	6	76	104.8	18	
	8	76	103.8	20	Marked perspiration. Lower extremities cold.
	10	75	99.7	18	
	12 M.	74	99.6°	20	
	2 P.M.	80	100.6	19	
	4	80	104.6	15	
	6	76	104	18	
	8	76	109	17	Attack two to three minutes. Feels badly; tongue and lips dry. Clonic spasms of the muscles of the jaw. During attack pulse and respiration regular.
8	2 A.M.	72	100.6	17	Sleeps well.
	7	80	106.8	15	
	9	81	107.2	15	Pulse irregular.
	9	78	101	20	Pulse irregular.
	1 P.M.	75-94	110	14-48	Attack.
	3	75	113	20-60	Attack.
	3.30	76	..	70-14	Attack.
	4	..	..	..	Half-hour sleep.

DR. JACOBI'S WORKS

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
	5	75	107.2	30	
	7.30	80-74	113.4	66-44	Attack. Complains of pain in the back of the neck. Suddenly unconscious. Groaning. Respiration short. After attack so confused that he imagines it is noon. Asks for morphine so as to be able to sleep.
	8.30	..	..	..	Is asleep without it.
9	1 A.M.	72	108.2	18	Is asleep.
	4	78	106.2	21	Is asleep.
	8	84	103.8	21	Pulse full, strong, regular.
10		78	99.4	19	Feels very well.
	2 P.M.	84	106.4	22	Marked palpitation of the heart.
	2.30	75-80	113-98	16-54	Movements of deglutition with lower jaw.
	3	..	..	18-22	Attack.
	5	75	104.6	20	
	7	80	101.2	23	Pulse alternately slow and rapid.
	11	74	104	16	Sleeps quietly.
10	4 A.M.	72	103.6	22	Sleeps quietly.
	7	82	—104.8	24	Marked perspiration lower part of body.
	7	82	—105.6 K.	24	
	10	82	—104.8	28	
	10	82	—105.4 Ax.	28	
	12 M.	87	105	30	Attack.
	2 P.M.	98	—100.8	24	
	2 P.M.	98	—105.2 K.	24	
	4	81	—103	22	
	4	81	—103 T.	22	
	6	75	102.6	22	
	8	82	102.6	21	Attack. Eyes converge. Whole body in tonic spasm. Marked extension of the extremities. Fingers flexed, later extended. Abdominal wall tense. Duration fifteen minutes.
11	1 A.M.	64	102.8	20	Sleeps quietly. From now on head-nurse, Mr. Reyher, takes a skeptical view of the attacks, which he allows the patient to notice; and in his presence makes but trivial and inaccurate notes of the different spasmodic attacks and fainting-spells. On the other hand, nurse, Mr. Mielsch, acts very much worried about the condition of the patient, takes most elaborate notes of the details of the different attacks, which the patient is allowed to read. As the result of the above, during the day service of nurse Reyner the patient has no attacks (for six days); dislikes the nurse very much, complains about the same

HYPERTHERMY UP TO 148°

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
					to Dr. Bullinger, and expresses his preference for his night nurse, Mielsch. As soon as the service of the night nurse begins, the patient has attacks at intervals; the other nurse is usually called, and is then present. After the attack the patient carefully looks over the notes made at the time.
8:30 P.M.	Patient complains of sudden, marked, stabbing pains in the lower part of the spine, radiating toward the abdomen, and upward to the back of the neck, temples, and lower jaw. Trismus results.
9.30		92-85	117.0°	60	Attack thirty to thirty-five minutes. Patient feeling languid from preceding attacks, requests that the temperature be taken before sleep. While the thermometer is in the rectum sudden unconsciousness; eyes open and turned upward. Duration two to three minutes. Then the whole body is extended, the eyes, now converging, are now closed; grasps the back of the neck with the left hand; groans, turns to the right side; puts his hand to his forehead, and apparently awakes. After a few minutes the eyes again become fixed and converge; he paws the air with his hands; the chest is pushed forward and the head backward. Face and upper part of chest slightly red. Patient gradually awakes, is apathetic and talks incoherently. During the attack the heart's action is usually irritable. The character of the respiration varies; long, deep inspirations suddenly become short and jerky. Breathes through nose only; expiration shorter than inspiration. A quick, short breath precedes the return to normal breathing.
11 P.M.		94	117.0	20	Perfectly conscious in spite of the high temperature, but feels languid.
12 2 A.M.		78	108.6	26	
6		76	103.4	24	Pulse regular.

DR. JACOBI'S WORKS

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
	8	87	102.4	20	Pulse very irregular.
	12 M.	75	105.0	25	Pulse very irregular.
	2 P.M.	96	—109.0 R.	21	
	2 P.M.	96	—108.6 K.	21	
	4	81-94	115.0 Ax.	24-60	Thermometer burst.
	4.15	..	..	..	Attack. Palpitation; trismus; convergent strabismus. Spasmodic contractions of body twice. Seems to be unconscious for four minutes. Indicates that he has pain in the back of the neck. On recovering his voice he asks for a drink, and gets out of bed to pass urine. Claims that he has difficulty in passing urine after an attack. Duration twelve minutes.
	6	82	117.0	20	
	9	70	107.0	23	Pulse regular.
	12	64	108.0	32	Pulse regular. Complains of sudden loss of memory. At the time of an attack, patient no longer froths at the mouth, which was formerly tinged with blood, since nurse Reyher told nurse Mielsch, in the presence of the patient, that anybody could do that by simply biting the lip, or injuring the gum with the finger-nail, etc.
13	6 A.M.	66	104.2°	18	Pulse regular.
	8	78	106.6	26	
	10	78	107.2	22	
	10.30	..	105.4 Ax.	..	
	1 P.M.	72-92	—117.0	38	
	1 P.M.	72-92	—117.0 Ax.	38	Light attack, as described.
	1.20	74	—114	24	Lower extremities feel warm, but patient asks for hot-water bags.
	1.20	74	—113 K.	24	
	3	81	—103.8	30	
	3	81	—103.2 Ax.	30	
	5	75	—106.8	27	
	5	75	—104.8 Ax.	27	
	7	72	—110.6	27	
	7	72	—109.4 K.	27	
	9	75	117	14	
14	1 A.M.	66	106.6	22	
	6	70	—106.6	16	
	6	70	—104.6 K.	16	
	7	..	110.2	..	Marked perspiration.
	8	82	—103	22	
	8	82	—102.6 Ax.	22	
	10	72	—102.8	24	Patient reads the paper, is in a good humor and feels well.
	10	72	—101.5 Ax.	24	Is in the open air for one hour on the stretcher.
	1 P.M.	75	—101.6	21	
	1 P.M.	75	—101.6 Ax.	21	
	3	81	—105.2	21	
	3	81	—104 Ax.	21	
	5	66	—109.4	22	
	5	66	—108.2 Ax.	22	

HYPERTHERMY UP TO 148°

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
	7	76-80	—117	18-60	Attack. Duration twenty
	7	76-80	—115 Ax.	18-60	minutes.
	10	76	110.2	21	
15	7 A.M.	90	—104.2	20	
15	7 A.M.	90	—102.6 K.	20	
	9	84	—106.6	21	
	9	84	—105.2 Ax.	21	
	11	66	—103.8	32	
	11	66	—102 Ax.	32	
	1 P.M.	81	—106.4	30	
	1 P.M.	81	—104.6 K.	30	
	3	72	—106.6	34	
	3	72	—105.8 K.	34	
	5	66	— 99	24	Patient gets up. Tempera-
	5	66	— 98 Ax.	24	ture taken ten minutes later.
	7	72	—103.2	24	
	7	72	—102 Ax.	24	
	11	70	117	26	Slept from 8 until 11 P.
					M. Thermometer shows this
					temperature in two minutes.
					Takes a drink and goes to
					sleep again. On awakening
					stretches himself and claims
					to have a sudden sharp pain
					in the lower left side. Has
					no attack.
16	1 A.M.	67	108.2	26	
	4	72	108.6	26	
16	6 A.M.	66	104.2°	25	Slept well all night.
	8	72	—102.8	28	
	8	72	—101.6 Ax.	28	Gets up and feels well.
	10	68	—108.4	32	
	10	68	—107.6 Ax.	32	
	10.15	..	..	..	Goes to bed and sleeps an
					hour.
	12 M.	75	—105.8	31	
	12 M.	75	—104.6 Ax.	31	
	2 P.M.	78	—107.5	28	
	2 P.M.	78	—106 Ax.	28	Patient rises and remains
					out of bed until four o'clock.
	4	81	117	32	Attack. Only moderate
					development of the former
					symptoms. Duration twelve
					minutes. Hears and under-
					stands everything; wishes to
					indicate by signs that he has
					lost his voice. In ten min-
					utes can speak again and is
					fully conscious.
	4.45	..	..	..	Jumps out of bed; wishes
					to be discharged at once,
					and behaves in an unruly
					manner.
	5.30	..	..	..	At first does not wish his
					supper, but later on he de-
					cedes to take it.
	6	..	..	..	Wishes to be discharged,
					and will not permit his tem-
					perature to be taken.
17	6 A.M.	..	..	..	Will not permit his tem-
					perature to be taken. Slept
					well all night.
	7	84	105	25	
	8	..	..	..	Gets up and feels well.
	9	78	103.4	..	

DR. JACOBI'S WORKS

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
			—108.2		
11		72	—107 Ax. —107 K.	31	
1 P.M.		72	103	28	
3		78	..	21	
4		69	101	27	Returns to bed. Has been up since 8 A. M., and feels well.
8		78	110.2	21	Slight attack. Eyes open. Toes and lower extremities strongly extended. Lower part of the body feels warmer than the upper. Holds the back of his neck with his left hand. ¹
18	3.45 A.M.	64	117	28	Attack. Patient sleeps restlessly, occasionally complains of pain in the back of the neck. Suddenly unconscious, eyes open, not converging. Mouth open. Fingers extended, but not separated much. Legs stiff, toes extended. Left arm remains for some time in the position given it. Shortly before he regains consciousness the eyes are closed. Duration ten minutes.
4		72	105.6 —107	28	
6		76	—106.8 Ax. —106 K.	22	
18	8 A.M.	72	108°	22	
10		78	—105.4	26	
10		78	—104.2 Ax.	26	
12 M.		72	—103-8	24	
12 M.		72	—102.6 Ax.	24	
..	..	..	..	..	In the presence of the patient, Dr. Bullinger reproaches the head-nurse for having made but poor observations of the attacks. Dr. Jacobi is said to have complained and threatened to have the nurse discharged. Immediately after this the patient has three attacks, and after each one nimbly jumps out of bed to read the notes made by the nurse.
2 P.M.		72	—105.2 —104.2 Ax. —104 K.	27	Slight attack of spasmodic contractions. Eyes and mouth somewhat open.

¹ After the visit of Dr. Jacobi, the head-nurse takes the following notes on a sheet of paper: "During a spasmodic attack the eyes and mouth must be open, the tongue protruding. The extensors of the foot contracted; the toes extended. The arms should be elevated, and should temporarily remain in any position they are put in. During a fainting-spell there must be some convergent strabismus." Patient reads the notes and immediately wishes them explained to him. He is also informed that Dr. Jacobi is dissatisfied with the record kept to date, and desires the closest observations made of the different attacks, notes on which are to be taken at once. After this the attacks which occurred corresponded exactly with the notes above mentioned.

HYPERTHERMY UP TO 148°

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
					Ankle-joint and toes extended. Head cool; chest warm. Duration three minutes. After attack said that his tongue felt heavy. Did not know that he had had one. After that felt cheerful. Suddenly notices that he cannot see with his left eye; at a distance of one foot counts two fingers instead of five. After twenty minutes he can read the paper.
	2.30	80		40	
	3	80	—117(?)	36	Spasmodic attack, more marked than former ones. Pain in the back of the neck. Extension of the whole body. Rigidity. Toes extended. Any difference in surface-temperature cannot be felt. Refused to have temperature taken the second time. Duration two minutes.
	3	80	—117(?) Ax.		
	4	75	..	36	Complains of pain in the back of the neck.
	4.30	80	117.0	30	Spasmodic attack. Eyes converged. Eyes and mouth open. Whole body extended. Tonic spasm. Toes extended. Left arm remains a few seconds in the position given it. Right arm the same. Duration ten minutes. Refused to have temperature taken again.
	5.45	75	107.2	28	Complains of pain in the spine and the back of the neck. Head-nurse Reyher takes a skeptical view of the attacks. Patient sleeps from 6 to 7 P. M. Perspiration on forehead, in axilla, and flexor side of knee. Has an immense appetite. Tells nurse Mielsch of his hatred toward the head-nurse, and says he will do all he can to get the latter out of the service.
	8	80	117	4-44	Immediately after his meal has severe pain in the back of the neck. Becomes unconscious on introduction of the thermometer.
18 ..	..	..	..	..	Attack. Eyes open, convergent, and elevated. Mouth open. Right arm placed with shoulder extended, does not remain so; remains a few moments when placed with elbow flexed. Shoulder and elbow of left arm remain in any position in which they are placed. Fingers of left hand slightly

DR. JACOBI'S WORKS

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
					flexed, index-finger more so. Thumb extended and abducted. Legs rigid and cannot be bent at the knee. Foot and toes extended. Any difference in the surface-temperature cannot be appreciated. Breathing; at first patient takes a deep inspiration every fifteen seconds, followed by a short, quick expiration. At the middle of the attack the respiration becomes more rapid (44) and snorting in character. The eyes are then closed. A short time after the patient becomes conscious and utters a sharp cry of pain. After the attack he will not allow his temperature to be taken.
18	8.45 P.M.	..	..	..	Complains up to the present time of a pain in the back of his neck. Asks that a narcotic be given him. Claims also to have a darting pain in the region of the heart, which radiates toward the axilla. Restless sleep from 9 to 11.30 P. M.
	11.30 P.M.	69	106.2°	18	
19	3.30 A.M.	64	105.2	25	Sleeps quietly.
	6	73	109 R.	19	
			—108.2 Ax.		
	6.30	..	—107 K.	..	
	8	100	—104.4	28	The temperature is taken
	8	100	—103 Ax.	28	with the patient standing up.
	10	66	—106.2 R.		
	10	66	—105.2 Ax.	23	
	12 M.	61	—103.4 R.	..	
	12 M.	61	—102.4 Ax.	..	
	2 P.M.	68	—103.2 R.	22	From 2.30 to 3 P. M. patient visits a friend in a neighboring ward.
	2 P.M.	68	—102.2 K.	22	
	4	72	—106.8 R.	30	Has had no attacks during the service of the head-nurse.
	4	72	—106.6 Ax.	30	
	6	69	103	27	Has the sensation as if he had received several injections of morphine, which he attributes to the new medicine. Complains of pain in the eyes and head. Sleeps from 6.30 to 9.30.
	10	66	108.4	29	Sleeps from 10 P. M. to 1.30 A. M.
20	1.30 A.M.	62	113	32	Slept quietly during the night.
	4	63	106.6	32	
	6	104	108.6	38	
	7	..	..	..	Patient gets up.
	8	72	117	28	Attack. Eyes and mouth open. Unconscious. Differences in surface-temperature

HYPERTHERMY UP TO 148°

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
					not noticeable. Duration two minutes.
12 M.		..	..	..	In bed from 8 to 12 o'clock.
7 P.M.		80	117	34	Does not wish his temperature taken.
	7.15	..	118	..	Attack. Unconscious. Eyes and mouth open. Froths at the mouth. Extremities extended. Fingers spread apart and rigid. Toes extended. Index-finger flexed. Loses voice. Duration ten minutes.
	7.40	..	..	..	Attack. Unconscious. Eyes open and looking straight ahead; later converge; then closed. All the extremities except the right arm rigid. Hands spasmodically contracted. Toes extended. Froths at the mouth. Suddenly he becomes violent, kicks with his legs, throws his arms about, elevates the upper part of the body. Becomes more quiet, and awake. No differences in surface-temperatures perceptible. Duration ten minutes.
19	7.50 P.M.	..	98.4°	..	Temperature taken by Dr. Bullinger immediately after the attack.
	8	..	..	..	Fainting-spell. Unconscious. During the attempt to change the position of the bed the patient awakes, is furious, and threatens to do the head-nurse bodily injury with a chair. Patient complains to Dr. Bullinger about head-nurse Reyher and would rather leave the hospital than be attended by him. Head-nurse is transferred to other duty.
	10.30	93	102.8	34	Goes to sleep after the bed has been put back into its former position.
21	2 A.M.	64	106	32	
	4	70	111.8	34	Temperature taken with patient standing.
	6	77	105.8	34	Gets up. All temperatures taken from 6 A. M. to 2 P. M. with patient standing up out of bed.
	8	102	—103.4	30	
	8	102	—101.2 Ax.	30	Pulse full and strong.
	10	97	—105.4	36	
	10	97	—104.8 Ax.	36	Pulse irregular.
	12 M.	90	—103.6	32	Takes a walk in the yard
	12 M.	90	—102.4 Ax.	32	from 12.30 to 2 P. M.
	2 P.M.	86	104.2	34	
	3	90	106.8	32	Goes to bed. The house physician re-establishes

DR. JACOBI'S WORKS

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
					friendly relations between the patient and the head-nurse, and the latter resumes duty.
	4.30	84 75	111.2 107.4	48 32	Patient feels badly; has pain in the region of the heart.
	5.15	..	—111 R.	..	Temperature taken with patient out of bed and standing up. Head-nurse allows
	5.15	..	—109 Penis	..	patient to observe that he does believe in the attacks, and tries in other ways to get on good terms with him.
	6	105	123	..	Attack. Complaints of palpitation of the heart and marked thirst. Unconscious. Mouth and eyes open, the latter turned upward and not converging. Lower extremities fully extended, some twitching of muscles of the thigh. Blg toe fully extended. Both upper extremities remain in any position into which they are placed. Right hand is perfectly relaxed. Palpitation gradually subsides. Suddenly tonic and clonic spasms of the whole body. After lying quietly, wildly throws himself about. The knees are drawn to the abdomen for a short time. Fingers of the left hand spread and slightly flexed. Pulse 81. Respiration 42. The head is suddenly and spasmodically fully extended; the face becomes very red; breathes quickly and noisily. Eyes are now tightly closed. When the body is held forward the tongue protrudes to the outer margin of the lips, and feels perfectly relaxed. Some trembling of the lower jaw. Differences in surface-temperatures not perceptible. Consciousness returns in twelve minutes. Is now very thirsty and drinks the contents of two siphons in forty-five minutes.
	19 7 P.M.	100	117°	44	Attack. Like the former, but less marked. Duration five minutes.
	7.10	..	113 Ax.	..	Temperature in the axilla with patient out of bed. Mercury reaches the limit of the thermometer in a few seconds.
	7.30	..	110 Penis	..	

HYPERTHERMY UP TO 148°

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
22	9	97	—112.8 Rect.	44	Goes to sleep.
	9	97	—110 Penis	44	
	2 A.M.	74	110.6	34	
	6	82	—111.0 R.	42	
	6	82	—109 P.	42	Temperature taken with patient out of bed.
	7	92	—113.0 Ax.	46	
	7	92	—111.0 Penis	46	
	8	75	—106.0 R.	39	
	8	75	—104.6 P.	39	Temperature taken with patient out of bed.
	9.30	82	—109.8 R.	42	
	9.30	82	—108.4 P.	42	
	10.30	72	—106.1	41	
	10.30	72	—105.2 M'th	41	Temperature taken with patient out of bed.
	12 M.	90	110.6	36	
	2 P.M.	82	—106.2	34	The upper part of the body feels warmer than the lower.
	2 A.M.	82	—104.2 P.	34	
	4	76	—104.8	24	
	4	76	—103.2 M.	24	
	7	Moderate attack during sleep. Violent efforts at swallowing. Gurgling sounds. Eyes open and fixed. Toes flexed. Patient awakes, talks irrationally, sees visions of people on the ceiling, who wish to put him out. Complains of a burning sensation inside of his body and drinks the contents of a siphon in a few minutes.
	7.20	86	123.0	58	Perfectly conscious. Thermometer introduced by the nurse; temperature reached in three minutes.
	7.35	..	117.0	..	Patient has a marked sensation of fear; becomes unconscious. Eyes converge and move from one side to the other. Mouth open and the tongue protruding. Extremities rigid. Duration five minutes. Conscious; much thirst; talks irrationally.
	8	No appetite. Attack. Duration five minutes. In addition to usual symptoms there is a general convulsive trembling over the whole body.
	123.0	..	Temperature taken by Dr. Bullinger.
	8.30	75	123(?)	37	Attack. Duration five minutes. Thermometer introduced into the rectum, was found broken when withdrawn, temperature questionable, no other reason known to nurse if not broken by heat. Dr. Bullinger was present. During this attack, patient sud-

DR. JACOBI'S WORKS

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
					denly developed an intense redness over the face, upper part of the body, and arms only, lasting but a short time. Intense thirst; drank contents of one siphon.
	9.30	..	117	..	Attack. Marked fainting-spell. Duration fifteen minutes. Mouth and eyes closed tightly. Surface of the abdomen and thighs very warm; chest, head, and legs cool. Tickling in nose and ears causes no reaction.
22	10 P.M.	..	..	..	Talks and is irrational.
	10.30	..	..	..	Goes to sleep.
23	2 A.M.	64	108.4°	36	Sleeping quietly.
	5	72	117	32	
	5.05	..	101.2	..	With the same thermometer taken five minutes later.
	6	..	111.8 Penis	..	Thermometer reaches this temperature quickly.
	7	..	..	..	Patient gets up.
	8	74	103.8	34	
	9.30	..	..	..	Patient goes to bed.
	10	78	103.6	30	
	12 M.	78	105.2	38	Patient gets up.
	2 P.M.	75	106.5	36	Patient goes to bed.
	4	45	107	30	
	6	60	107.8	24	
	9.30	64	109.8	30	Patient is asleep.
24	2 A.M.	72	109.5	37	Patient has pain in the back of the neck.
	5	70	107.2	42	
	7	97	—112	44	Upper part of the body hot, lower portion cool; the whole covered with perspiration. Head is very hot. With this he is out of bed. Complains of headache and backache. Believing he will have an attack, takes the thermometer and introduces it himself.
	7	97	—111 Penis	44	
	7.30	108	—128.5	..	Attack. Duration five minutes. Eyes closed, then open and converging. Fingers flexed. Convulsive twitchings over the whole body. Flexion and extension of legs, which are moist and cool.
	7.30	108	—117 Ax.	44	
	7.45	..	115	54	Temperature taken in the presence of both nurses.
	8	..	113 Penis	..	
	8.15	..	107.4	..	
	9	74	105.4	27	
	9.45	105	135.0	45	Attack. Duration eight minutes. Eyes and mouth open, etc. Spasmodic contraction of the muscles of the abdomen. Toward end of attack convulsive twitchings over the whole body; also of the jaw. Eyes con-

HYPERTHERMY UP TO 148°

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
					verge. Differences in surface-temperature not noticeable. Intense redness of the head and upper part of the body. Thermometer was introduced into the rectum with the right hand of the nurse; held there four minutes and withdrawn, patient having been uncovered. During the time, with the left hand the nurse held the left hand of the patient, feeling the pulse; at the same time the head-nurse held up the right arm of the patient. Then suddenly releasing it, it remained in the same elevated position for several minutes. Right hand perfectly relaxed.
	10	95	107.4	49	
	12 M.	95	99.8	40	
	2 P.M.	108	—118.4	45	Patient is much excited and has palpitation.
	2 P.M.	108	—117 Ax.	45	Palpitation. Feet cold and moist. Legs covered with perspiration. Upper portion of body warm. Forehead hot and perspiring.
	2.30	..	..	..
24	4.15 P.M.	106	—135.0°	45	Patient much excited. Suddenly unconscious. Attack. Duration five minutes. Usual symptoms. Also sudden intense redness of the head and upper portions of the body. After the attack he trembles violently and becomes unconscious. Eyes open and the pupils react to light. Conscious in two minutes and goes to sleep soon after. Thermometer continually held by the nurse while the temperature is being taken.
24	4.15 P.M.	106	—117 Ax.	45	No appetite for the last two days.
	6	75	114.6	36	
	7.30	80	113.4	43	
	10.30	..	..	..	Attack during sleep. Duration four minutes. Usual symptoms to a slighter degree. Talks much during his sleep.
25	5 A.M.	66	107.8	36	
	6	102	111.8	38	
	6.30	..	..	..	Gets up.
	8	92	108	38	Temperature taken with patient out of bed.
	10	72	106.8	36	
	12 M.	88	114.2	37	Temperature taken with patient out of bed.
	2 P.M.	92	116.4	38	Temperature taken with patient out of bed.
	4	75	117.	38	In bed from 2 to 4 P. M.

DR. JACOBI'S WORKS

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
	4.25	106	111.2	44	
	4.30	92	44 Cels.	42	
	4.40	81	41 Cels.	36	Last two temperatures taken in the axilla with patient standing up out of bed. Feels ill and goes to bed. Palpitation not irregular. Feet cool, legs warmer, thighs and body warm, head hot. Perspiring on the flexor side of knee, axilla, and on the forehead. Has no appetite.
	7.30	97	—131.6	36	
	7.50	97	—131 Ax.	36	Taken by Dr. Bullinger.
	9	96	127.2	108	Attack. Observation by Dr. Fischlowitz. "Left hand became claw-shaped and the fingers could not be extended. The right remained normal. Arms when elevated remained so. Toes were extended in a tonic spasm and both feet became involved. The chest and neck were red and a scar on the left side became very visible. Convulsive opisthotonos followed by clonic spasm. After the attack very thirsty and craved water."
	10	105	136.0	45	Attack. Observations by Dr. Fischlowitz. "Similar to the one at 9 p. m. I tried suggestion on the patient, but it had no effect. Immediately after the attack he sleeps for a few minutes, then awakes and talks very slowly and in a moderate tone of voice."
	11	82	117	38	
26	6 A.M.	66	115	38	Patient gets up. Temperature taken out of bed.
	8	78	113.6	44	Has no appetite. Returns to bed.
	10	76	108.2	38	Patient gets up. Temperature taken out of bed.
	12 M.	84	106.4	38	
	4 P.M.	86	109.8	36	Patient goes to bed. Temperature taken out of bed.
	6	116	—133	45	Attack. Same symptoms.
	6	116	—131.2 Ax.	45	Drs. Schottky and Fischlowitz.
	6.30	94	122.6	46	Attack. Same symptoms. Drs. Schottky and Fischlowitz.
26	6.50 P.M.	88	111°	47	
	10	68	116.5	40	Marked perspiration on chest, arms, and hands, flexor side of knee, and in the axilla; not elsewhere.
	11	78	—125	48	Attack. Feels badly, becomes unconscious, and has
	11	78	—123 Ax.	48	

HYPERTHERMY UP TO 148°

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
					the usual symptoms. Also intense redness over upper portion of body, neck, and head. The bloodvessels of the neck are very much distended. Duration five minutes.
	11.10	74	119	54	Fainting-spell. Unconscious. No spasmodic contractions. Lies perfectly quiet. Awakes in three minutes with a start, and looks about in alarm. Has a spasm in the back of the neck, and claims that he cannot turn his head.
	11.35	76	105.6	36	
	11.45	..	104.2	..	When not having an attack appears cheerful, but his limbs feel tired.
27	6 A.M.	98	107.4	38	
	8	76	101.4	32	
	10	72	104.4	36	Is out of bed. Complains of cold and returns. Has extra covering and hot-water bags.
	12 M.	78	105.8	36	Temperature taken with patient out of bed.
	2 P.M.	72	109.4	38	Transferred to Male Ward No. 1.
	4	96	114.2	48	Temperature taken by the patient. Hands over the covers.
	4.50	110	—124	50	Both temperatures taken
	4.50	110	—118 Ax.	50	by nurse with patient standing. Sudden short attack like the preceding ones.

The following days are without any records of temperature, the man being moody and at times violent, and unwilling to submit to the use of the thermometer

March 5	2 A.M.	68	148.0°	72	Thermometer introduced by patient and removed by the nurse.
	2.30	70	118.0	36	Attack. Duration three minutes.
	6	68	—115.0	36	
	6	68	—113.2 Ax.	36	Much thirst.
	8	84	112.6	40	Temperature twice. Was in a bad humor all day. Would not permit the taking of temperature. Spent most of the time sitting on a chair and looking straight ahead.
	6.30 P.M.	96	119.2	44	
	9	80	120.6	60	Thermometer introduced by the patient. Attack. Palpitation. Face flushed, skin otherwise pale. Perspiration on the legs and feet. Respiration superficial. Pulse regular. Upper ex-

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Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
					tremities rigid, later relaxed. Duration seven minutes.
	10	80	136.0	60	Feels cold. Spasm in the back of the neck. Pain in the left side.
	10.15	68	137.0	64	
	10.30	..	121.8 K.	..	Thermometer introduced and removed by the nurse. Complains of palpitation. Spasmodic attack. Twitchings all over the body. Difficulty in breathing. Face hot and flushed; surface of the body cool; feet damp.
6	10 A.M.	66	119.0° Ax.	40	Temperature taken with patient out of bed, in the presence of Dr. Bullinger. Skin is pale and the arms are relaxed. Ten minutes later patient seems languid and weak.
	2.15 P.M.	90	124	48	
	10.30	72	133.4	64	
	12 M.	72	148	60	Thermometer introduced by the patient, and removed by the nurse during unconsciousness of the former.
7	12.18 A.M.	..	127	..	Feels very weak, and sleeps soundly until 4 P. M.
	4	72	116.0 Ax.	40	Temperature taken with patient out of bed.
	6	80	117.0	40	During the day the patient was very unruly, and would not permit his temperature to be taken. Had taken offence at the remark of the nurse, when the latter asked him if he were going to have a temperature of 150° again.
	10.30 P.M.	80	135.0	40	Thermometer introduced by the patient and removed by the nurse. Attack. Duration five minutes. Eyes and mouth closed. Head flushed. Fingers flexed. Toes extended. Unconscious.
	11.15	84	132.0	50	Patient is on better terms with the night-nurse, and allows the latter to quiet him. Has not eaten anything all day, but now takes food with relish.
	12 M.	72	116.0	40	
8	12.15 A.M.	..	135.0	..	Temperature taken with patient sitting in a chair.
	1	68	142.0	48	Attack. Spasmodic contractions. Unconsciousness.
	3	..	127.0	..	
	4	72	148.0	68	Attack. Pain in the back of the neck and on the left side. Unconscious. Face flushed. Mouth half open, tongue protruding. Extremi-

HYPERTHERMY UP TO 148°

Date.	Hour.	Pulse.	Temp.	Resp.	Remarks.
					ties tremble. Conscious and very thirsty.
	6	80	114.4	36	Thermometer introduced and held by the nurse.
	1 P.M.	90	116.0	40	
	3	90	112.8	42	
	5	84	111.8	40	Patient was quite sensible all day. Out of bed most of the day.
9	8 A.M.	96	115.8	36	
	10	90	113.0	40	
	12 M.	100	109.8	44	
	2.45 P.M.	96	143.8	48	Palpitation. Slight spasmodic contractions. Unconscious four minutes. Could not speak for fifteen minutes.
	4.50	100	142.0	56	
	5	84	125.0	48	
	6.15	..	132.0	..	Very thirsty. Drinks very much.

Again there was, after this, a period of moodiness and the exhibits of violent temper, so that no temperatures were taken. In the early morning hours of January 13th he stole away from the hospital. Many weeks afterward he appeared at my residence, but left before I could see him. Since I was told he had again applied for and gained admission to the Long Island Hospital, but I was unable to verify this report.

Temperatures, unless otherwise marked, taken in the rectum.

" " marked P., taken in the urethra.

" " Ax., " axilla.

" " K., " popliteal space.

The symptoms of this thoroughly hysterical man—all the patients on whom abnormally high temperatures were noticed were women, with the exception of the case of Mr. Davis, in which the highest temperature was 112° F.—and observations made were about as follows:

Spasmodic contraction;

Slight chills;

Fainting-spells;

Irregular respiration;

Trembling of extremities;

Chills followed by spasm, contractures, and fainting;

Chills followed by perspiration;

Languor, weariness;

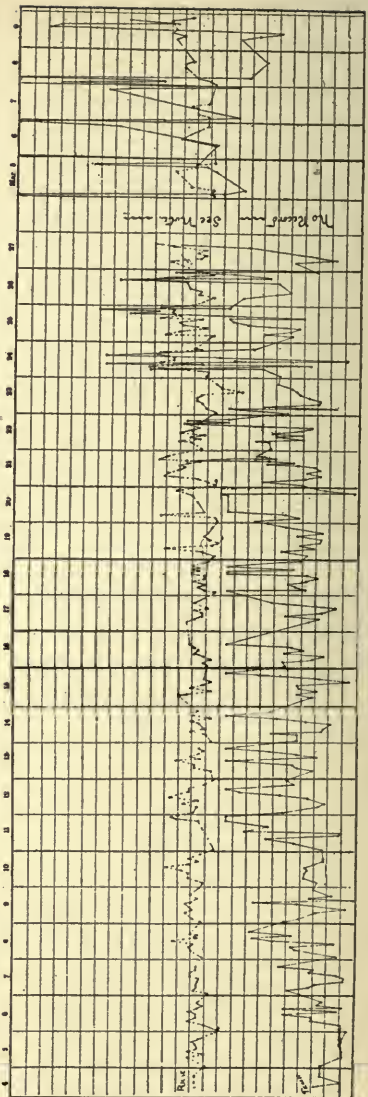
Expectoration of blood;

Feels good;

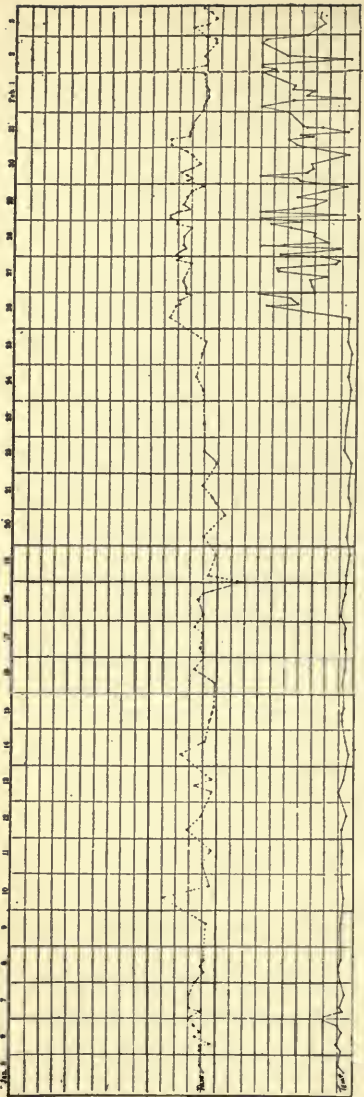
Pain in back;

Buzzing in ears;

Palpitations;



100
 90
 80
 70
 60
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100
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HYPERTHERMY UP TO 148°

Fear;
Groaning;
Hoarse voice;
Weak pulse, cold perspiration;
Loss of control of tongue and lower jaw;
Amblyopia half an hour;
Tongue very dry, immovable, could not speak for three hours;
Choking-spells;
Cyanosis;
Right eye counts fingers at four inches, cannot see with left;
Hears well with right ear, not at all with left;
Lower jaw fixed.
Diaphragm fixed; cyanosis to blackness.
In another attack of the same kind uses accessory muscles of respiration, and requests that his arms be elevated, as he can breathe better in that posture;
Crying-spell;
Paleness;
Tonic spasms;
Tongue, gums, uvula, and mouth not sensitive to touch;
Water poured into his mouth does not cause attempts at swallowing, but occasions coughing and interferes with respiration;
Photophobia;
Footsteps or moving a paper annoys him; screams; puts his hands to his ears;
Pupils contracted;
Intense thirst;
Pain in side;
Laughs and talks;
Indulges in poetry directed to wife;
Apathy;
Twitching in left cheek;
Chronic contractions followed by tonic of the whole body;
Grinding of teeth;
Wakes up with a start, points to the ceiling;
Pain in back of head;
Mouth and eyes closed;

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Delirium;

Inarticulate sounds;

Pain in abdomen; .

Hungry;

Tongue swollen;

Trismus;

Perspiration of head and lower extremities, while body dry;

Forehead, chest, and lower extremities cold, while arms perspire;

Convergent strabismus;

Pain in spine, neck, temples, and jaw;

Chronic spasm of muscles of jaw;

Unconsciousness;

Asks for morphine to sleep, sleeps without it;

Pulse regular, full;

Movements of deglutition;

Abdominal wall in tonic contraction;

Hates the day-nurse, who is skeptical, and has no attacks in six days; has them after the night-nurse comes on, who takes elaborate notes, which the patient is allowed to read;

Has cataleptic spasms after having been told what the visiting physician expects of him;

Conscious during temperatures of 117° and 132° ;

Pulse very irregular, while but slightly increased in frequency;

Difficulty in passing urine;

Loss of memory complained of;

Frothing of mouth tinged with blood. Is stopped after he heard one nurse telling the other that such things were often done by biting the lips;

Loss of speech temporary;

Refuses temperature-taking for days;

Is sometimes violent and unmanageable;

Is up and about;

Means to have his skeptical nurse discharged;

Violent during an attack of contractions and unconsciousness which began with temperature of 118° at 7.15 p. m.,

HYPERTHERMY UP TO 148°

followed at 7.50 P. M., immediately after the attack, by 98.4° ;

Pulse strong and full, followed by irregularity, while frequency the same. Pulse very rarely affected by temperature. Respiration sometimes shallow and more frequent than pulse, but not in proportion to temperature;

Pain about heart;

Burning sensation inside of body;

Perfectly conscious at 123° , with respiration 58 and pulse 86;

Tickling in nose and ears without reaction;

Irrational.

Temperatures taken in different parts of the body do not always exhibit a normal relation to each other, or to pulse and temperature.

February 24th, 7 A. M. Temp. R. 112° , urethra 111.2° ; 7.30 A. M. R. 128.5° , ax. 117° ; 8 A. M. penis 113° , P. 108, R. 54; 9.45 A. M. R. 135° , P. 105, R. 45, during this temperature head flushed, twitching, cataleptic attack; 10 A. M. 107.4° ; 12 M. 99.8° ; 2 P. M. 118.4° ; 4.15 P. M. R. 135° , P. 106, R. 45, ax. 117° .

During a temperature of 127.2° , pulse 96, respiration 108 at 9 P. M., an hour later 136° , 45 R., P. 105.

Perspiration, during 116.5° , respiration 40, pulse 68, limited to chest, arms, and hands, flexor side of knees, and axilla.

Intense redness of neck, head, and upper part of trunk, during temperature of 125° R., 123° ax.

Difference between R. and Ax. temperature 6° (124° - 118°).

Nine observations made March 5th: Lowest temperature 112.6° , highest 148° ; lowest number of respirations 36, highest 72; lowest pulse 68, highest 96; at 148° , R. 72, P. 68; on the following day at the same temperature R. 60, P. 72. This time he was unconscious. March 8th at 4 A. M., temperature 148° , R. 68, P. 72, with pain in back of neck and on left side, unconscious. Face flushed, mouth half open, tongue protruding, extremities tremble; when again conscious was very thirsty.

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From March 5th to 9th thirty-four temperatures were taken, all in the rectum, with the exception of two in the axilla, and one in the popliteal space. These temperatures ran as follow: 109.8°, 111.8°, 112.6°, 112.8°, 113°, 113.2°, 114.4°, 115°, 115.8° twice, 116° four times, 117°, 118°, 119°, 119.2°, 120.6°, 121.8°, 124°, 125°, 127° twice, 132° twice, 133.4°, 135° twice, 136°, 137°, 142° twice, 143.8°, 148° twice.

• The absence of any dependence of pulse and respiration on these temperatures is proven by the following figures:

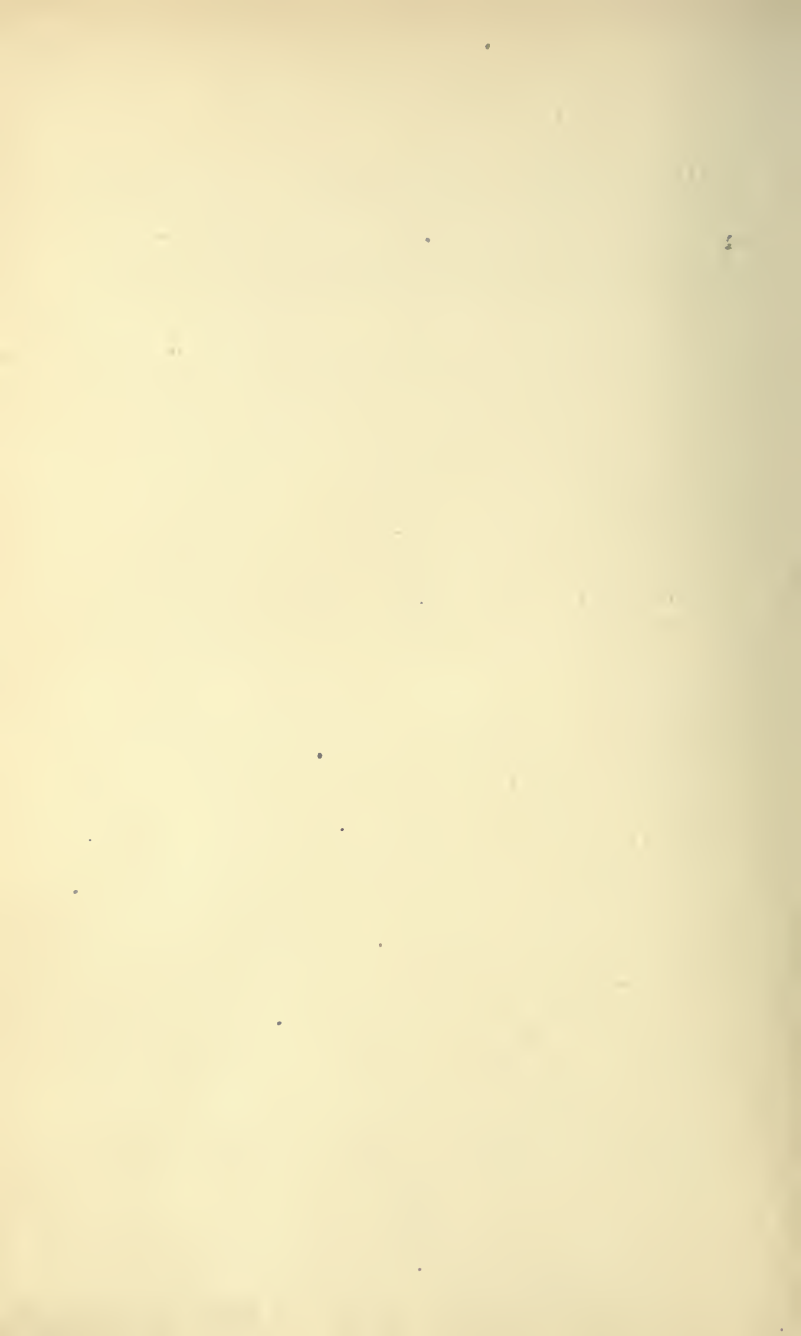
Temperature.	Respiration.	Pulse.
109.8°	44	100
112.6	40	84
116	40	72
124	48	90
132	50	84
137	64	68
142	48	84
148	68	72
143	72	68

The rapid changes of the temperature at times have been alluded to, but the persistence of high temperatures during several days, averaging much more than 120° through a period of five days, is still more remarkable. The alternation in the man's other symptoms is very striking, nervous disorders, such as hallucinations, fainting spells, contracted pupils, contractures, being noted at low and high temperatures. Meanwhile the urine was not much affected. Micturition was sometimes difficult, but the composition and gravity of his urine, often inspected, sometimes examined, exhibited no particular anomalies.

Unfortunately the temperature of the urine was not taken. His sleep was mostly good, sometimes long, appetite usually good, and there was no emaciation. Evidently the action of the nervous system uncombined with that of a toxin, and its effect on the heat-centre or centres, or on the inhibition-centre, does not interfere with the

HYPERTHERMY UP TO 148°

performance of the functions of the organs superseding digestion, assimilation, and elimination. The probability is that such a case as described by me points to high temperatures being caused rather by a paralysis of the inhibitory faculty, such as was suggested by H. C. Wood, than by a direct influence on the heat-producing centres.



HEMORRHAGE FROM A PYOTHORAX

MARIA C., aged seven years, born in the United States, of Italian parentage, was admitted to the Jacobi Ward of the Roosevelt Hospital, New York, October 29, 1900. The family history was negative; the personal history, according to the rather unintelligent parents, was good until present illness. The child was taken ill a month previous to admission; she felt languid, rather feverish, had no appetite, lost flesh, had some pain about right chest, and coughed occasionally; the temperature on admission was 102° F.; there was marked dulness over the right lung, lower lobe, up to the fourth or fifth rib; there was flatness over the base; the voice and breathing approached the bronchial near the apex, and were absent over the base; the respiration was 40; the pulse, 140; the appetite was good; sleep was fair.

Puncture on November 1st yielded pus.

Operation under chloroform November 2d. Five centimeters of the sixth rib, in front and below the angle of the scapula, were removed. White and inoffensive pus flowed out readily to the amount of perhaps 500 c.cm., not mixed with blood. Thiersch's solution was injected; it returned with a little more pus, which was slightly colored with blood. All at once a large quantity of blood was discharged, which, when the irrigation was stopped, proved to be undiluted blood. It was clear it could not come from the intercostal artery, which was not touched. Full irrigation was again resorted to for a few seconds; the light being good, and the opening large, the blood was seen oozing in quantities from tufts disseminated over the pulmonary pleura, the costal not being within view. These tufts could easily be distinguished with the fingers, extended over a large surface, and were quite numerous, large and small, some being nearly a centimeter in diameter, others ap-

parently not over the size of a pinhead. Altogether at least 250 c.cm. of blood were thus lost. The lung not expanding readily, the cavity was immediately filled with large quantities of sterile gauze, which was allowed to remain in place for two days. When it was removed some little fresh blood was seen to ooze from a few large granulations. Gauze in somewhat smaller quantities was introduced; it was removed after two more days, when no blood was found, with the exception of a few small clots swimming in pus. The cavity, which diminished in size, was again filled with gauze for some days, until a drainage-tube could be safely inserted. At that time the pleural surface was no longer red, the granulations had shrunk so that the thickened membrane exhibited only some flat and occasionally rough elevations of a grayish-yellow color. A careful search for a malignant tumor had no results, nor was there a suspicion of tuberculosis¹ or of maceration and corrosion of the surface; and there was certainly no adhesion between the two pleuræ, the tearing of which could have given rise to some of the hemorrhage which took place.

Within a few days the temperature became normal and remained so with a few interruptions. The child's weight on October 29th was thirty-nine pounds seven ounces; on November 7th, thirty-eight pounds—the difference was apparently due to the pus and blood lost on November 2d; on the 14th, thirty-nine pounds ten ounces; 29th, forty-one pounds four ounces; January 9th, 1901, forty-seven pounds twelve ounces. A few days after she was discharged, the recovery being retarded by the slowness of the expansion of the lung, held down as it was by the thickened pleura.

Hemorrhages into the pleura may take place from rupture of an aneurysm, ulceration of the aorta, bleeding from the venæ cavæ, caries of the rib, penetrating wounds or contusions of the lungs, or thrombosis. F. W. Zahn, Geneva, described (*Virchow's Archiv*, 1885, vol. vii. p. 345) a case

¹ During the discussion of this case Dr. Osler asked whether some tissue had been removed from the tufts for examination. That was omitted on account of the extensive hemorrhage, which seemed to permit of no delay.

HEMORRHAGE FROM A PYOTHORAX

of bilateral hemorrhagic pleurisy following the thrombosis of the vena azygos. It was observed in an alcoholic coachman of thirty-two years and followed extensive trauma and inflammation of the inguinal region. In this case the pleurisy appears to have followed the hemorrhage.

Other causes are primary or secondary malignant tumors of the pleura. Even in those cases in which a copious hemorrhage into the pleura takes place, with no suspicion of malignancy or other adequate causation, the final history corrected the first impression.

In the *Transactions of the Clinical Society of London*, 1878, vol. xi. p. 136, Dr. W. N. Broadbent published a case of very rapid effusion and extravasation into the right pleural cavity of a man of seventy-six years. The amount of blood was very large, the whole cavity being filled. Two quarts of serum and blood were removed by paracentesis, and the patient recovered, so that the diagnosis of a malignant tumor was given up. But within eight months dyspnea returned and symptoms of malignancy made their appearance, and within a year he died.

Hemorrhages may be caused by sepsis at any age, mainly in the newly born. Such hemorrhages, however, are mostly petechial.

In a *Thèse* of Lacaz-Duthiers there is a case, of Tardieu's, of pleural hemorrhage without inflammation which necessitated thoracocentesis. It occurred in a cachectic man with paralysis and cystitis.

Resembling the hematoma of the dura mater, a pleural hematoma is described by Mesnil and Netter. It is the result either of the rupture of newly formed bloodvessels or of diapedesis (Fraentzel). Andral (*Clin Méd.*, 2d edition, p. 473) has the case of a man of forty whose right pleural cavity, as far as it was not obstructed by adhesions of the upper lobe to the costal pleura, was filled with blood which extravasated from the fibrinous deposits of the pleura.

Contrary to what is observed in the common form of hemorrhagic pleurisy, where the blood amounts rarely to more than 10 per cent., more or less genuine hemorrhage is observed in purpura hemorrhagica, scruvy, hemophilia,

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pernicious anemia, variola, leukocythemia, icterus gravis, chronic diffuse nephritis or interstitial hepatitis. Pleural hemorrhages in heart diseases are rarely copious.

In tuberculosis there is, as a rule, hemorrhagic pleurisy, but no clear blood. Still, Henri Blumenthal has the case of a woman of sixty years who died with her pleural cavities filled with blood. He speaks of the presence of gray granulations which are evidently tubercles (*Thèse: sur les hémothorax non traumatiques*, 1868).

A case of pleural hemorrhage, from Nothnagel's Clinic, was reported by J. P. Crozer Griffith in *The Medical News* of August 1, 1885. It was not, as had been supposed, the result of a hemorrhagic diathesis but of miliary pleural tuberculosis.

My case was unique in my experience and furnished an additional cause of hemorrhage into the pleural cavity. Scanning the literature has not added to my knowledge on this special cause of bleeding. That is why I have asked a number of active surgeons in regard to it, and was told they had not seen its like. That is also why I claimed a very few minutes of your time to make this communication of a case in which the pleural abscess behaved to an unusual degree similarly to what may be observed in abscesses situated in looser tissues elsewhere, in which granulating tufts spring up from the surface with, occasionally, a very moderate tendency to bleed.

JACKSONIAN EPILEPSY: ADENOMA OF LIVER; ACUTE ASCITES WITH TUBERCLE BACILLI

A. A. was born August 7, 1885, and died January 16, 1897. Her father was always in good health, her mother at one period of her life neurotic. Father's family was without any morbid taint; mother's ancestors died when seventy-five, eighty-five, and ninety years old. She is the youngest of ten boys and girls, none of whom died young. One sister died of cerebro-spinal meningitis, and of "fistula" after having been insane, one brother (the oldest in the family) was an army officer during the civil war and died insane. Of the seven now alive, one, a man of great abstract learning and a college professor, with healthy children, is epileptic.

A. A. weighed eight pounds at birth, sixteen when six weeks, twenty-eight when ten months old. Her first teeth (lower incisors) appeared at six months; the others, both temporary and permanent, came in due order and without any trouble. She walked when a year old. She was wet-nursed, never perspired on the head, lost no hair, had no thickened epiphyses, her limbs were straight. The only symptom reminding of rickets was constipation, which appeared at the age of six or eight weeks, and required enemata until she was five years old. At three years of age she had whooping-cough; at four, measles; no other disease.

In September, 1891, she fell from a swing, hurting the left side of her head. She did not get pale nor vomit; she cried, and appeared uninjured. In January or February, 1892, her right hand was noticed to twitch a little. In November she began to take music lessons, the twitching became stronger and more frequent, and the lessons were discontinued. On the first of November, 1893,

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she had on waking in the morning her first hard attack of convulsions, probably with loss of consciousness. The second attack of the kind took place on the 16th. There was complete loss of consciousness and slow recovery. Thick, incoherent talk; slight paralysis of the right arm. During two days previously the child, who was remarkably observing and intelligent, had noticed fatigue and pain in her right arm, and told a playmate she was going to have an attack. On November 24th she complained of tiredness and numbness in both arms, more so in the left. She slept poorly during that night, and experienced slight twitchings in her right hand. Feeling an attack coming on at 6.30 A. M., she jumped up with the idea of preventing it. It was slight, with no loss of consciousness. Slight stiffness of legs. She said she had to hold on to the foot of her bed, as she was not quite steady. Afterward she felt absolutely well, and played all day. Had taken bromides two days; they were continued in moderate, and later on in larger doses, so as to give rise to bromism repeated. Slight twitchings of the right arm in the night of February 18, 1894. March 9th, while running, she tripped and fell, striking her right arm heavily. She complained at once of twitchings, which, though slight, continued over an hour. She was put to bed, but she complained of their coming more frequently while she was lying down; tying a cord round the arm above the elbow made the twitchings stronger. She seemed very nervous and worried each time the arm twitched. When she was read to the shaking stopped instantly, and she was well all day. Evidently this attack had but partly the significance of the former ones. Right arm shook badly on waking April 4th, after she had been playing, skating, and falling several times the previous afternoon; again on April 13th and May 22d. During two days previously she had complained of fatigue and pain of her left hand. She had been writing a good deal, however, with her left hand previously, having been taught and accustomed to use her left hand in place of the right when the local convulsions began. Slight attack on the 27th, two on June 2d.

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Most of the attacks would come on in the morning on waking up; they lasted mostly a few minutes, and were but rarely attended with unconsciousness. She would often laugh and joke immediately afterward. During most of the attacks, and often days before, the child was pale; sometimes she was irritable before or after them, in some instances for days. But very few times she had more severe attacks during her sleep, breathing heavily and shaking all over her body. Before she was taken to Europe in the summer of 1894, she had, however, only very few of these hard attacks. Up to this time, and also later, she enjoyed the occasional advice of Dr. S. Weir Mitchell, who saw her both in Philadelphia and in New York. Drs. Gowers and Jackson saw her in London. It was principally the former who objected strenuously to the performance of an operation the advisability of which had been suggested.

During her European trip she was not changed. Slight attacks would come mainly when she was, or had been, fatigued; five during August, 1894. After three slight ones, on her return, she had a fully developed epileptic attack in her sleep on October 26th. After a few slight ones, in January, 1895, the attacks ceased entirely while she was taking, first fifty, afterwards sixty grains of bromides daily, together with lithia and valerianate of zinc. The bromides having disagreeable effects (as heaviness, drowsiness, bloated face), were discontinued June 8th, and valerianate of zinc only administered. Attacks returned—one on the 25th, two the 26th, three the 27th, four the 28th, six the 29th, four the 30th (wetted the bed the first time), six on July 1st (was given again bromides, grs. 60 daily, zinc valerian., 30 grs., stropia, gr. $\frac{1}{120}$), six on the 2d and on the 3d, nine on the 4th and on the 5th, five on the 6th, and three on the 7th. The bromides again showing a disagreeable effect, they were diminished, and the daily medication consisted of 30 grains of the bromides, 15 grains of valerianate of zinc, 10 grains of zinc oxide, and $\frac{1}{50}$ grain of atropia.

No attacks until December 21st (slight) and 22d (hard), after which she was given 60-70 grains of bromides daily,

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and 30 grains of valerianate of zinc, for one week. They were then stopped a while, the attending physician, who saw her often every day, changing the medication as circumstances appeared to demand.

During 1896 the case changed for the worse. There was a severe convulsion on January 2d; it began in the right arm, and was mostly confined to the right side. Unconsciousness lasted but a few minutes, but there were great weakness and numbness of the right arm. It is quite important to remark that her intellectual faculties suffered very much less than the arm from an attack. On the 3d there was a severe local convulsion of the right arm without any unconsciousness, and one slight attack on the 15th, 16th, 18th (two attacks), and the 20th. On the previous night her palor was excessive and her pulse feeble. In February she had twenty-one attacks of shaking or twitching of the right arm (one of the fingers of the right hand only) on ten days altogether. During March, 1896, the attacks, all of them localized, no general convulsions, became both more numerous and more severe. She had four on the 1st, five on the 2d, three on the 3d, 4th, 5th each, four on the 6th and 7th each, six on the 8th and 9th each, seven on the 10th, eleven on the 11th, fourteen on the 12th, twenty-seven on the 13th, twenty-six on the 14th, twenty-nine on the 15th, forty-nine on the 16th, twenty-five in the night of the 17th, twenty-six on the 18th between 7 A. M. and 9 P. M., twenty-eight on the 19th during the same hours, and nineteen in the following night. The last few days many of these local convulsions were attended with heavy breathing, the body was often drawn to the left while the right arm was drawn up or shaking, or both, and on the 19th the mouth was noticed to be drawn to the left.

It was on that day that Dr. Charles A. Dana saw the patient. To his kindness is due the following report:

"The patient was seen by me March 19, 1896. She was a well-grown girl for her years, and apparently well-nourished, but quite anæmic. Her mind was particularly bright and mature. She had a slight weakness of the right arm, but no paresis of the facial muscles or of the

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legs. The knee-jerks on both sides were normal, not exaggerated on the right side. The right arm showed a certain amount of ataxia. There was an inability to place the finger easily on the tip of the nose with the eyes closed, or perform delicate muscular movements, such as buttoning the clothes or picking up small objects from the table. There was also a slight lack of localization sense, so that she could not determine exactly the point touched by the hand or arm. There was, however, absolutely no anæsthesia, tactile, pathic, or temperature anæsthesia. The elbow-jerk was present. There was no atrophy or any tremor or spasmodic movement in the arm. The tongue protruded straight, and there was no asymmetry of the facial muscles. The patient had no concentric limitation of the visual field or aural field, no loss of sense of smell or taste, no pharyngeal anæsthesia; in fact, absolutely none of the stigmata of hysteria. There was simply the weakness of the arm, with ataxia and defect in "motor touch," such as is found in disease of the motor cortex. During the examination she had several slight convulsive attacks; the arm was extended, the forearm pronated, the hand flexed, and the whole arm raised out somewhat from the side. The head was drawn over, to some extent, to the same side; but the eyes did not move. There was some twitching of the muscles of the face of both sides. There was no biting of the tongue, and had not been. The attack came on suddenly, and without cry or distinct aura; the patient asserted that it was not accompanied by loss of consciousness. It lasted only one or two minutes. After it was over the arm was, for a time, almost paralyzed, but after a few hours gained considerable strength. She would have a number of these attacks during the day. Shortly after my visits began they ceased, however, and the arm grew gradually stronger, less clumsy, and eventually she could use it nearly as well as the left, though never quite the same.

"The attacks were quite typical examples of a Jacksonian epilepsy. She had had at no time any severe headaches, no vomiting, and had no optic neuritis. The diagnosis at the time was Jacksonian epilepsy, due probably

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to some slight degenerative changes in a limited area of the motor cortex."

Under the direction of Dr. Dana she took on March 20th nitroglycerin, gr. $\frac{1}{200}$, and urethan, grs. 5, every two hours, bromides, grs. 50, through the day. She had thirteen severe attacks through the day (they had since becoming so numerous been more frequent during the day), and nine in the night; on the 21st forty-five and fifteen (bromides grs. 45, urethan grs. 45, nitroglycerin 6 tablets of $\frac{1}{200}$ gr.); on the 22d thirteen hard attacks and thirty-three slight twitchings from 6 A. M. to 10 P. M.; six times the right leg shook with the arm. There were four slight attacks in the following night (medication, bromides grs. 35, urethan grs. 50, tablets No. 7). On the 23d there were forty-nine slight twitchings between 8.30 A. M. and 10 P. M.; none in the night. Medication, bromides grs. 30, urethan grs. 55, tablets No. 3. The child was much brighter and stronger. On the 24th there were twenty-one slight twitchings between 7.30 A. M. and 9.30 P. M. Medication, bromides grs. 30, urethan grs. 60. On March 25th and the following days the same medication and no attack whatsoever at any time. On April 1st albuminuria was noticed, and urethan was given in doses of 45 grains; on the 3d less albumin, urethan 30 grains. This dose was continued. On the 6th there was hardly a trace of albumin, and the appetite good. At the same time daily doses of 30 grains of bromide were given; from July 5th to July 11th she took 25, after that 20 grains daily.

It should be here remarked that during the time of the greatest number and severity of the attacks large doses of bromides, up to 100 or even 120 grains, were given daily, together with, or without, the valerianate of zinc, and had often to be discontinued because of serious bromism. The only time in which the attacks ceased and the patient felt better at the same time was when she took urethan.

She continued this medication while in the Catskill Mountains all summer, 1896. Her general condition did not improve; she lost flesh and was pale, though in fairly good spirits most of the time. The amount of albumin in

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her urine, which was considerable while she was having her attacks, diminished. But while there was hardly a trace and sometimes none in the middle of the summer, there was constantly a small quantity of bile in the urine. In October I saw her. She was in bed, pale (she *never was icteric*), with anorexia and a frequent pulse. She improved somewhat until in November she felt better, took drives, and with slight support once walked ten blocks. Then her general condition, however, changed for the worse, without any fever or other tangible symptoms. I saw her with Dr. Dana on December 1st. During that month she grew thinner and paler. On December 28th her nurse noticed some swelling of the abdomen, which had been rather sunk and lean. That swelling was observed plainly by the mother and by Dr. Dana on January 2, 1897. It was considered to be due to obstruction of the bowels; a high enema brought away a peculiar substance, mixed with some blood, of greenish color and offensive odor. The temperature was but slightly raised, and there was no pain. Within one or two days the abdominal cavity filled up with fluid, the diaphragm was somewhat impeded in its motion, respirations increased to thirty and thirty-six. No anasarca, no local œdema anywhere. The abdominal veins were very numerous and dilated, but no caput Medusæ.

A few days afterward her (moderate) dyspnœa became a little less annoying; the abdomen appeared a little less tense, and the veins somewhat smaller. Still this apparent temporary improvement did not last, and in a very few days the general condition suggested the necessity of an operation the beginning of which was to be a laparotomy. Dr. McBurney joined Dr. Dana and me in a consultation. The suddenness of the abdominal effusion suggested the presence of a thrombosis of the portal vein, or the presence of a tumor of some kind, perhaps tuberculous lymph-bodies, compressing the portal vein. The spleen had been made out to be large the previous week; the liver appeared somewhat swollen. Some solid or semi-solid masses could now and then be felt, but we could not be certain whether we had to deal with normal or inflamed and ad-

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herent intestines or neoplastic growths, or peritonitic exudations. During all this time her strength gave way slowly, with very poor appetite and a urine which, after having been copious, became scanty and dark. In the last few weeks its specific gravity ranged from 1,025 to 1,033, its urea about 0.031 in 1 c.cm. There was a faint trace of albumin, no sugar, little oxalate of lime, very little bile, a large amount of urates and phosphates, some bladder epithelium, and some little pus and mucus.

Laparotomy was performed by Dr. McBurney on the 10th. There was a gallon or more of a thin yellowish fluid in the abdominal cavity. Its specific gravity was 1011; it contained but little albumin and few salts. These examinations were made of specimens of fluid which were removed when the discharge was about half finished. The spleen was found to be large, the liver of moderate size, there were no adhesions between the intestines or between them and the abdominal wall or the viscera. No large neoplasms. The omentum was in good condition, the mesenteric glands were not swollen; the glands surrounding the portal veins were felt to be enlarged, so as to form a thick mass encircling and pressing on the portal vein.

The surface of the liver was shining and covered with very numerous yellowish-gray bodies. They were of different sizes, from the head of a pin to that of a bean. Those of the latter size were felt reaching far down into the liver tissue. They were taken to be tuberculous.

Many specimens of the abdominal fluids were centrifuged and stained, and examined for tubercle bacilli or other microbes. One in six such specimens yielded *large quantities of bacilli tuberculosis* in close proximity to each other.

The general condition of the patient did not improve after the operation. Her axillary temperature was never over 100.8° in the axilla, usually 100° or less, down to 98.8°; the respiration remained between thirty and thirty-six; her pulse rose until on the day of her death, January 16th, it reached '158, but little influenced by stimulant sub-

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cutaneous injections, which were continued until about twelve hours before she died.

The autopsy was made on January 17, 1897, twenty-four hours after death, by Dr. James Ewing. The following report is mostly from his pen. By his painstaking investigations extending over many weeks he has placed me under lasting obligations.

REPORT OF AUTOPSY.—Body that of a moderately well nourished, distinctly anæmic child. Rigor mortis slight. No œdema or jaundice

Heart. Pericardium normal. Right chambers moderately distended with clotted blood. Left chambers contracted, nearly empty. Valves, muscle, endocardium normal. No dilatation or hypertrophy.

Lungs. Show considerable venous congestion and œdema. Bronchial nodes deeply pigmented, not tuberculous. Pleural cavities contain a few drachms of serous fluid.

Peritoneum. Intestinal walls uniformly anæmic, peritoneal coat is slightly dull and in places granular. In pelvic cavity, about drainage-tube, are a few drops of pus, and a light purulent coating over adjacent coils of intestine. Parietal peritoneum shows evidences of intense venous congestion, presenting large patches of superficial dark and bloody infiltration. No miliary tubercles were anywhere seen, after close scrutiny.

Liver. Size about normal; surface and section dotted with very numerous light yellow nodules, from pin-head to pea-sized, very sharply outlined from the surrounding tissue. Some of these nodules project slightly above peritoneal surface. They are not caseous, but otherwise closely resemble miliary tubercles. There are many less on the surface than in the interior. The hepatic tissue shows very distinctly the gross appearances of chronic congestion, the centers of the lobules being very deep red and depressed, the peripheries very light colored, but no blood oozes from the sections.

Gall-bladder. Contents and mucosa appear normal.

Spleen. Considerably enlarged, four to five inches long, consistence firm. On section the Malpighian bodies ap-

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peared very prominently set off from the deeply congested pulp tissue.

Kidneys show moderate venous congestion, but are otherwise normal. *Adrenals* normal. *Pancreas* normal. There is marked superficial congestion of ovaries, otherwise the organs are normal.

Intestinal mucous membrane appears normal. The solitary follicles are only faintly visible. The stomach is moderately congested and coated with mucus.

On opening the peritoneal cavity attention was at once directed to the condition of the portal vein. The gastro-hepatic omentum was found much thickened and very firm, the enlargement proving on dissection to be due to swelling of the periportal lymph nodes, four or five of which, measuring from 5 to 1 cm. in diameter, formed a nearly continuous mass along the portal vein. Undoubtedly these nodes during life produced considerable narrowing of the lumen of the vein. On removing the liver and a portion of the diaphragm, an enlarged lymph node, measuring $1 \times 1\frac{1}{2}$ cm., was found lying immediately above and adherent to the hepatic vein at its junction with the vena cava. It was hard, and its capsule covered with large veins, so as to look almost angiomatous. It did not seem possible that the hepatic vein could have escaped partial compression by this considerable mass of tissue. On section these lymph nodes appeared deeply congested, but not tubercular. No thrombi were found in either the portal or hepatic veins. The mesenteric nodes were not enlarged.

Brain rather large, the convulsions not flattened. *Pia mater* was opaque, whitish, thickened, and rather hard over a large surface; moderately congested, mostly so over the region of the motor centers. This change was more perceptible on the left side than on the right. In this neighborhood the convolutions were rather separated from each other and felt hard. This condition was suggestive of interstitial swelling in the white substance. The structure of the brain appeared normal everywhere, the ventricles were empty, the plexuses normal.

The left half of the *cranium* was smaller and flatter than the right.

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Over the left motor center there was a defect in the structure of the bone, $1\frac{1}{4}$ cm. wide and $2\frac{1}{4}$ cm. long, in a forward and downward direction. The bone was translucent, its outer surface quite smooth and on a level with the rest of the cranium, its inner surface depressed. This depression was quite sharp, as in craniotabic defects. There were two more such defects on the same left side, in a forward direction, quite as wide but shorter, about 3 cm. from the median line. One more such spot was found over the left brow; another was located over the left motor center, $1\frac{1}{2}$ cm. long and $1\frac{1}{2}$ cm. wide. The space of the large fontanelle, $2\frac{1}{2}$ by 3 cm., was occupied by hard, thick, and rather irregular bone, which was surrounded by a narrow (about $\frac{3}{4}$ cm.) semi-transparent area. To the left of this, and rather forward and adjoining the coronal suture, was a triangular osseous island, also flanked by a transparent area.

The *impressiones digitatæ* and Pacchionian depressions were more pronounced on the left side.

On the occiput, where a trauma was sustained five years previously, no abnormal condition was observed.

The *pia* is moderately congested, and over the whole convexity is considerably thickened and opaque. The *brain* tissues appear normal. The thickness of the *parietal bones* varies greatly, especially along the sagittal suture.

Microscopical examination. The liver shows the usual lesions of advanced chronic congestion, with complete atrophy of cells at the centers of lobules, and slight fatty degeneration of cells at the peripheries of lobules.

The small nodules above described prove to be miliary adenomata. They are composed of thick cords of hypertrophic liver cells, usually containing more than one nucleus, and at some points showing considerable fatty infiltration. The larger adenomata are surrounded by a distinct fibrous capsule, within which effects of chronic congestion have not been felt, as the capillaries of the adenomata are not at all widened.¹ The cords of liver-

¹ In this respect our specimen differs from the majority of the few cases which have been described. In them the liver-

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cells surrounding the nodules are much compressed for a considerable distance. (See drawing.)

The lesions in the *lymph nodes* include:

1. A chronic inflammatory hyperplasia, with the produc-



tion of new connective tissue, extensive exfoliation of endothelial cells, and atrophy of lymphoid cells.

2. An extreme dilatation of veins and capillaries, both within and without the nodes.

The inflammatory process has replaced considerable portions of the nodes by a tissue apparently composed of flattened and fusiform endothelial or connective cells, and entirely lacking in lymphoid cells. In these areas the

cells were thoroughly compressed and destroyed by copious interstitial tissue, and new cells were developed through a compensatory process.

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capillaries are often dilated and gorged with blood. The lymph nodules are all quite small, and many appear to have been replaced by the above tissue. There is a slight deposit of anthracotic pigment in the fibrous tissue. The large neighboring veins are enormously dilated, and possibly increased in number so as to give an appearance not unlike that of a cavernous angioma. The venous stasis has likewise affected the vessels within the nodes, the medullary lymph cords being entirely absent and replaced by dilated blood-spaces or fibrous tissue. The condition of the lymph nodes indicates a process of older date than that of the changes in the liver.

The *mesentery* shows œdematous infiltration, and about some small vessels are collections of mononuclear and polynuclear cells.

The *spleen* shows the effects of chronic congestion equally marked with those of the liver. The sinuses are much dilated, and the pulp-cells contain a large deposit of blood-pigment.

The *intestinal wall* shows a light coating of fibrin with exfoliation of endothelial cells.

The *ovaries and Fallopian tubes* show venous congestion, but no other lesion.

Brain. The motor cortex of both sides was cut in thin slices and hardened in saturated watery solution of corrosive sublimate.

Sections stained by Nissl's method gave very unsatisfactory results, owing to advanced post-mortem changes. As nearly as could be judged, the motor areas of both sides were identical in appearances, including the numbers and configuration of the cells, and the character of chromaphilic bodies, and intracellular network. The pia of both sides was considerably thickened, that over the left motor area very much so.

Some capillaries were found containing colonies of cocci.

The ganglion cells of the cranial nerve nuclei (XII., X., IX., examined) showed no unusual appearances by Nissl's stain.

BACTERIOLOGICAL EXAMINATION. A portion of one of the superficial adenomata, including a section of the cap-

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sule of the liver, was inserted beneath the skin of a guinea-pig. Seven weeks later no inflammatory changes were to be found at the point of inoculation or in the adjoining lymph-nodes.

A similar negative result followed the inoculation of another guinea-pig with a swab from the fluid and pus in the bottom of the drainage-tube. The fluid in the drainage-tube, smeared on cover-glasses, showed the presence of numerous cocci in masses and short chains. Pure cultures of *staphylococcus pyogenes aureus* and of *streptococcus pyogenes*, of marked virulence, were secured by Dr. Charles Norris from this same fluid.

The fluid from the drainage-tube and sections of the intestinal wall, mesentery, liver, spleen, and lymph-nodes were stained for tubercle bacilli, with a negative result.

The serosa of the inflamed intestines contained cocci in moderate numbers.

The spleen contained large numbers of minute colonies of cocci, and in the motor cerebral cortex and in a lymph node single colonies of cocci were observed.

DIAGNOSIS. Chronic inflammatory hyperplasia of periportal and perihepatic lymph-nodes, of undetermined origin.

Partial compression of hepatic and portal veins.

Chronic congestion of liver and portal visera. Multiple miliary adenomata of liver.

Ascites.

Peritonitis. Tubercle bacilli in the fluid.

Septicæmia.

EPICRITICAL. From the pathological standpoint the obscure feature of the case is the relation of the swelling of the perihepatic lymph-nodes and the condition of the liver. In the absence of any other adequate cause it is necessary to conclude that the advanced chronic congestion of the liver was due to a compression of the hepatic vein from the enlarged lymph-node lying above and upon this vein. It then becomes necessary to discover a cause of this hyperplasia of the lymph-nodes, which, with the periportal nodes, were the only ones in the body thus affected. Several possibilities may be suggested. It is

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possible that the lymph-nodes were subjected to chronic irritation from intestinal toxæmia, in which case it is difficult to see how the mesenteric nodes could have escaped, as they did, a similar irritation and hyperplasia. The probability of a serious retrograde irritation from the thoracic chains must be regarded with caution, since the thoracic nodes were not enlarged, and the bronchial nodes showed only moderate pigmentation. The deposit of pigment in the perihepatic node was very slight and apparently quite insufficient to induce the lesion found in the node. Nevertheless such a possibility may be entertained.

Cholecystitis could have affected the periportal nodes, and suppurative lesions in this viscus commonly do so; but there were no evidences, either gross or microscopical, of any disease of the gall-bladder. The considerable size of some of the adenomata ($\frac{1}{2}$ cm. in diameter) suggests that these may have been the primary lesions, and that the disordered condition of the hepatic circulation and function led to the hyperplasia of the lymph-nodes draining the organ. While there is no positive evidence on which to deny such a course of events, many recent studies of nodular hyperplasia of the liver tend to show that this lesion usually represents a regenerative tendency, well marked in liver-cells, to replace disordered or destroyed hepatic tissue by way of compensation. No other cause for liver congestion can be found in our case in heart, pleura, or lungs. Some extensive studies of this character have been contributed, as follows:

Flock, Ueber Hypertrophie und Neubildung der Lebersubstanz. *Deut. Arch. f. klin. Med.*, 1905, Bd. lv.

Merchand, Ueber Ausgang der acuten Leberatrophie in multiple knotige Hyperplasie. *Zeigler's Bact.*, 1895, Bd. xvii. p. 206.

Meder, Ueber acute Leberatrophie mit besonderer Berücksichtigung der dabei beobachteten Regenerationerscheinungen. *Ziegler's Beit.*, 1895, Bd. xvii., p. 143.

Therese, Des adenomes du foie. *L'Union Médicale*, 1985, No. 34.

Babes et Manicatide, Les proliferations des cellules

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hèpatiques dans les différents affections du foie. *Ref. Cent. f. Path.*, etc., 1896, No. 23.

The very general distribution of the nodules in the present case, and the fact that they represent areas of apparently normal liver-cells—in the drawing (p. 436) the presence and absence of these cells in adjoining territory are beautifully represented—in which the effects of the chronic congestion were not at all noticeable seem to support strongly the view that these miliary adenomatas were entirely the result of the advanced chronic congestion and atrophy of liver-cells which affected the entire organ.

As already stated, moreover, the lesion in the lymph-nodes appears to have been probably of older date than the adenomata of the liver.

Pressure on the hepatic vein having been once established, thereby obstructing the venous return from the nodes themselves, it is readily seen how the course of events should lead to exactly the condition found at autopsy.

The peritonitis and septicæmia which terminated the case may properly be regarded as the natural and very frequent result of the sudden relief of pressure from the abdominal viscera, especially the intestines, allowing the passage of intestinal bacteria into the peritoneum and apparently, also, into the general circulation. The intestinal lumen contained a very abundant growth of cocci; the streptococcus and staphylococcus were isolated from the peritoneum, and bacterial thrombi composed of cocci were found in the spleen abundantly, and in the brain and lymph-nodes.

This consideration affords also a clue to the presence of tubercle bacilli in the serum contained in the abdominal cavity. They are transferred through the circulation, either of the blood or the lymph. The latter would start from lymph-nodes which were, however, nowhere affected, nor was there any organ or tissue infected with tuberculosis. Therefore the presence of tubercle bacilli can be explained by transmission through the blood-current only. Evidently they were only a complication, and incident. When the rapid effusion took place from the blood-vessels of the peritoneum and the intestine, where the bacilli hap-

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pened to be located, without having given rise to local or general symptoms, the vessels were emptied of a thin serum—of 1011 specific gravity—with all its contents. The alkaline fluid in the abdominal cavity proved an excellent nutrient and a preservative for the bacilli.

The presence of bacilli in the ascitic fluid, in the absence as well of tuberculous deposits or degenerations anywhere, as of lesions in the intestine which could be charged with admitting the microbes into the circulation, is no longer an improbability, since it has been proven that surface lesions of a mucous membrane are not required to admit tubercle bacilli nor hiatuses in the epithelial covering, such as are possessed by the tonsils (Stoehr) in their normal state. It has been known for some time that initial lesions in the lungs, for instance, need not correspond with the localities of original affections, for pulmonary infiltrations will follow the subcutaneous injections of bacilli in distant places. Koch proved that lymph-bodies may become diseased without affections of their roots. Solid particles are swept through the lungs. The spores of saprophytes and of anthrax are so admitted. Whether this happens more readily in children, whose organs are less altered by the solid results of previous morbid processes, remains to be seen. Bollinger and Heller demonstrated that tubercle virus may penetrate through intact tissue, and that we need not assume with Babes that cocci prepared the soil for absorption in every instance. The tubercle bacilli in the ascites of our case can, therefore, be explained in one of two ways. They were, before entering the abdominal cavity, contained either in the circulating blood or in the intestinal tract. The former is very improbable, for there were no miliary deposits anywhere. The presence of bacilli in the intestinal tract is explained by the facility of their admission with food. It is probable there are but few intestinal tracts but are harboring bacilli now and then. It is under favorable circumstances only that they are absorbed instead of being expelled. Such favorable circumstances are either the presence of local lesions or sudden changes of osmosis. The latter existed in our case.

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The local cranial defects remain unexplained. If they had been found in the skull of a baby less than six or ten months old, they would certainly have been claimed as rhachitical. Craniotabes, however, after rhachitis gets well, seldom leaves behind any of these attenuated circumscribed spots. There was no symptom of rhachitis in the patient when an infant, except constipation. There was, moreover, no tumor, no thickening inside to explain a local absorption of such circumscribed character. I prefer to point to this instance of defective local bone development on some other than rhachitical basis.

It has been noticed that the pia and surface of the brain exhibited marked alterations from the normal, but none so circumscribed as to explain the localized spasmodic symptoms constituting the very picture of what we mean by the term Jacksonian epilepsy. The advisability of an operation undertaken to find and remove its local cause was often considered by the medical men who studied the case. It never was urged by anyone; it was advised against by some. Nothing that is positive can be learned from this feature of the case, except the necessity of care and caution and prudence.

A therapeutical remark will not be out of place. It has been seen that the bromides were sometimes required in such quantities as to interfere seriously with the general health of the patient.

When the doses of urethan recommended by Dr. Dana were given persistently the convulsive attacks ceased very soon, never to return, and there were no disagreeable symptoms attributable to the remedy.

PARTIAL, AND SOMETIMES GENERAL, CHOREA MINOR FROM NASO- PHARYNGEAL REFLEX

THE boundary lines between the normal and abnormal functions of the peripheral nerves are frequently but indistinct; thus it is that now and then morbid conditions are overlooked or underestimated. Changes of that kind are often tolerated with the expectation that the trouble will pass by, that the patient will outgrow it; and the period of the second dentition, or of menstruation, is held out as the future anchor ground for restored health. Many of these deviations are reputed to be but bad habits, for which admonition, punishment, and patience are put into requisition. But bad habits are just as well as the results of physical changes in the structure of the nerve centres or their outlying provinces, as morbid changes in the functions of the coarser viscera spring from their anatomical alterations.

For many years my attention has been drawn to some of these apparent habits which I soon recognized as actual diseases. The cases were so numerous after they had become familiar to me, that they soon lost their mark of novelty, and after I had once failed to speak of them except in clinical lectures, I looked upon them, because of their frequency, as daily occurrences and likely to be familiar objects in the practice of every physician. Thus I have never mentioned the subject in any assembly of my colleagues until recently, and was surprised to find what I considered trite, was still worth mentioning before a learned public.

I allude to a number of convulsive muscular movements of the face and the upper portions of the trunk. Children of three years and upward, up to the ages of puberty and even adult life, are given to blepharospastic winking with

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the eyelids, in rare cases with but one of them; momentary and frequent frowning, both horizontal and vertical; twitching of one or both angles of the mouth, and of one or both halves of the face; drawing up and wrinkling of the muscles of the nose; shrugging of a shoulder or both, now and then complicated with a violent, semi-convulsive twitching and tossing of an arm. These anomalous muscular actions persist for years, indefinitely; mild cases, however, I have often seen improve spontaneously during the summer months, and get worse during winter.

These abnormal actions are but rarely confined to a single muscle, even in mild cases two or more of the contractions I have mentioned are found together. In adults only, I have met with a few cases of partial twitching confined to a single cheek, exactly like the genuine *tic convulsif*. Now and then this clonic local spasm belongs to the same category, and is attributable to the same cause which is the subject of these remarks. Occasionally the local clonic contractions will lead to more severe complications. The muscular irregularities extend to the diaphragm, and over the whole body, and a genuine chorea minor is the result. This generalized chorea, when originating in this manner, is very much more liable to persist than the; perhaps, more severe cases we are familiar with as the results of articular or cardiac rheumatism, of spinal anæmia, or even of cerebral embolism. Unless their cause be recognized, I have seen them lasting through quarters and halves of, or even whole years, getting somewhat better occasionally, particularly in the warm season and good weather, but liable to return any moment. The large majority of patients of this class are children.

Besides the muscular anomalies mentioned, there are some others which draw our attention to the primary cause of the disorder. There is frequent snuffing up, snuffing out, a hawking, a short hacking cough which often is recognized as the result of a voluntary effort. The examination of the fauces reveals congestion of the whole surface, swelled muciparous glands, large tonsils with or without the results of previous inflammations or suppurations. They need not always be congested; such as have suffered

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most are even apt to be unusually *pale from the presence of compressing cicatricial tissue*. The pharyngeal congestion is observed to ascend in the direction of the posterior nares. The inspection of the nose reveals a congested and swelled mucous membrane, and the thickening and hyperæmia of the cavernous tissue particularly of the lower concha, which is justly claimed as the principal lesion occasioning many instances of spasmodic asthma or neuralgic affections of the trifacial nerve. The nostrils, or one of them, are always rather narrow, the septum frequently deviated, slight admixture of blood with the nasal mucus is sometimes noticed; now and then the cheeks and upper lips are puffed with chronic œdema, the so-called scrofulous face, and not infrequently the lymphatic glands of the neck, near and in front of the angle of the lower jaw, are swelled. Nasal catarrh is reported as frequent; many of the patients have been life-long snorers. Otherwise nothing appears to be abnormal, with the exception of those cases in which the persistent hyperæmic swelling and nutritive disorder had given rise to hyperplastic thickening. In many of these cases part of the surface is anæmic, dry, and rather hard. Nervous disorders of any kind but those described have not been observed; in fact, most of the children seen by me did not exhibit any universal neurotic expression or tendency.

Thus there is not necessarily a direct connection between these irregular choreic symptoms of local origin and general neurosis, at least the former do not depend upon the latter. If general nervosism were the cause, its effect would be apt to be general. For the local effect there is a local cause; even in the usual form of generalized chorea the involuntary spasmodic reflex movements are occasioned by local irritation. Thus it is that the quietude of sleep does away with choreic movements, but again semi-voluntary movements during a dream are liable to produce choreic irregularities even during sleep. The local cause of the local or partial chorea I have described, is found in the abnormal condition of the nasal and pharyngeal mucous membrane with its influence on the terminal sensitive ends of the trifacial nerve. It is to be assumed that the

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motor branches and terminal ends of the same nerve are first affected, and before any other nerves participate in the reflex symptoms.

These motor branches of the trifacial supply the masticatory muscles, the temporal, masseter, and pterygoid, the tensor of the velum palatinum, the mylohyoid, and the anterior belly of the digastric muscle (also the tensor tympani). It is these muscles which are brought into abnormal play in the symptoms described before. After some time only, the trapezius, the muscles of the upper extremities, and finally the rest of the body, participate in the display of irregular movements.

The sensitive and vasomotor reflex symptoms, mainly hemicrania and asthma, subsequent to the subacute and chronic swelling of the nasopharyngeal cavity, and particularly the loose cavernous cellular tissue of the inferior concha, are well known by this time to everybody. The results of the studies and therapeutic measures of Volto lini, Hænisch, Sommerbrodt, and particularly Hack, whose last lucid and modest *exposé* in the proceedings of the German Congress of Internal Medicine is but nine months old, have added greatly to our knowledge, and the relief, of the suffering. It is, however, not my object to repeat what most of us have read and practised by this time. Why I allude to their labors, has, however, its good reasons. Their observations are supplemented by mine. Theirs belong to the sensitive and vasomotor nerves, mine to the motor. Their observations have, moreover, the priority of publication. Mine date, in their large majority, from a period antedating by many years their published records. I make this statement in order to impress it upon the minds of my readers that I do not rely upon a few cases, but that in the course of many years I have seen so large a number that I feel confident there will be no lack of similar cases in practice, as soon as the attention of practitioners has once been drawn to their existence.

There is another reason why I allude to Hack's last exposition. As a reaction from his former enthusiasm over exaggerated results, he appears now to be a little doubtful

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about the importance of some local changes in regard to producing reflex symptoms. Hyperplasia and polypi are, according to him, no longer causes of reflex symptoms. On the contrary, according to him, they are liable to impede reflex, and when the latter does exist it is asserted to be present in spite, not in consequence, of hyperplasia and polypi. This I believe to be a mistake. I have no doubt, whatsoever, that many of my cases of muscular reflex were the result of irritation of nerve filaments embedded in hyperplastic and cicatricial tissue. The irritation of peripheral nerves in neuromata, and in cutaneous cicatrices, are the very best proofs of what a pinched nerve branch can get up in the way of suffering.

Nor has it appeared to me as if our knowledge of these matters, both as to cause and effect, was nearly complete. It is true, the description of the nose and pharynx as given by these authors, and that of the neuralgic and spasmodic reflex symptoms related by them, is both accurate and conclusive. But in both their symptomatological and anatomical teaching, something appears to be wanting. This want is perhaps the cause of the fact, that the therapeutical results leave much to be desired, as Hack is very anxious to state. In addition to that, insufficiency of the anatomical descriptions is particularly evident when we take into account the more modern researches of G. L. Tornwaldt ("On the bursa pharyngea in its relation to the diagnosis and treatment of certain diseases of the nasopharyngeal space," 1885), and of F. Trautmann ("Anatomical, pathological, and clinical studies on hyperplasia of the pharyngeal tonsil," 1886). I speak of both because of the relative novelty of the subject of nasopharyngeal reflexes, and of the difficulty of the anatomy of those parts which, though the rhinologists and rhinoscopists assure us that the diagnosis of these affections is rendered playwork with the aid of their modern instruments, mirrors, hooks, and lights, exist nevertheless.

Tornwaldt says that the entrance of the bursa pharyngea can be seen with the aid of hook and rhinoscope almost in every person. It is a groove, or an aperture—funnel-shaped, spherical, or oval—in the median line of the roof

of the fauces, in about the centre of the distance between the upper margin of the posterior nares and the protuberance of the atlas. The bursa itself has more frequently the shape of a sac or a blind canal than of a groove; as its aperture is mostly narrow, the bursa is a frequent starting-point of nasopharyngeal diseases. The affections of the bursa proper are of two kinds, first, hypersecretion in consequence of a catarrh spreading from the neighborhood, which is very apt to prove permanent though the original neighboring catarrh may have disappeared; and, second, cystic degeneration by obstruction of its outlet.

In persistent catarrh of the bursa the flow of liquid mucus, or the deposit of viscid mucus can be recognized in the midst of, or below a relatively healthy mucous membrane. The cyst is a tumor of a transparent yellow color. In some cases, however, it can be diagnosticated only by the absence of the aperture, the presence of cicatricial marks, and the absence of secretion in the midst of a congested and secreting neighborhood. An incision gives vent to the discharge of the liquid or pulsatious contents. The symptoms of both hypersecretion and cystic degeneration of the bursa are rather identical with those of nasopharyngeal catarrh. Of accompanying symptoms belonging to other organs the author mentions hyperæmia, hyperplasia, perhaps also polypi of the nasal mucous membrane, diseases of the ear, pharyngitis granulosa, chronic laryngeal catarrh mainly of the intra-arytenoid portion, bronchial and chronic gastric catarrh, cough resulting from the direct irritation by the descending secretion, and reflex cough not attended with perceptible laryngeal or pulmonary disease, bronchial asthma, and pain about the manubrium sterni, occiput, neck, or forehead. The duration of the diseases of the bursa is rather indefinite; they persist unless the bursa is restored or destroyed.

The pharyngeal tonsil which forms the subject of Trautmann's large monograph, is known to surgeons as one of the causes of retropharyngeal abscess. He, however, studies its pathology principally in its relation to the diseases of the surrounding territory, and to the reflex symptoms produced by it. Amongst these he refers particularly to

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cephalalgia of the temporal and frontal regions. He found it eighty-seven times in one hundred and fifty cases, and explains it by venous obstruction. It disappeared with the removal of the hyperplasia in every case except two. In one of these *vomiting* and *fainting* were observed once; there was a nasal polypus. *Tetany* twice in one hundred and fifty cases. Its explanation is as above, in the opinion of the author.

Venous obstruction in the nasal conchæ is absent in but few cases. It is mostly developed in the lower concha, and mainly in its posterior part. The second concha is not swollen to the same degree. The color is grayish-red, or bluish-red. When the disease is of old standing, there is hyperplasia of the subepithelial connective tissue, and the surface of the concha is no longer smooth. It becomes granular, and redder than before. After the hyperplastic pharyngeal tonsil has been removed, venous congestion of the concha will disappear. But the hypertrophy of the subepithelial connective tissue requires surgical treatment. The sense of smell was never abolished, and in all cases in which it occurred (eighteen times in one hundred and fifty cases), epistaxis ceased after the operation.

Thus it follows that the examination in cases of both sensitive and vasomotor reflexes on one hand, and the muscular reflex symptoms referred to by me, is not so easy as it appeared to be. I think there is reason to believe that the majority of cases of hemicrania and asthma which were not relieved by Hack, and others, by the galvano-cauterization of the hyperæmic and swollen tissue of the inferior concha, were not such as were caused by that affection, and that locality. The improved knowledge of the anatomy of the nasopharyngeal cavity will probably clear up the etiology of many a case which was not diagnosticated correctly, and both pharyngeal bursa and tonsil will come up for their share in both etiology and treatment.

There is another mistake which is very apt to lead to serious results. Nasopharyngeal catarrh is not a well-defined nosological entity. It is quite true that catarrh of the nose and pharynx, and also of the conjunctiva, are found together. This, however, every unprejudiced

practitioner has found to be a fact, that one cannot be cured without the other, and that when one remains the others will relapse. Still another fact must not be overlooked. There is many a case of nasal catarrh with all its consequences, both local and reflex, which is but the continuation and result of a pharyngeal catarrh. It will get well only when the latter has been removed. Thus many a rhinitis has to be treated in the pharynx, and many a pharyngitis in the nose; and both may never get well unless the enlarged or abnormal tonsils have been removed or resected. This is not only true of the large tonsillar masses closing in with each other, but also of those tonsils which having been the seats of repeated inflammations and suppurations, have nothing left but cicatricial tissue, broken-down follicles, and ducts of one-quarter to one-half inch in length leading in every direction, with abnormal secretions undergoing decomposition and giving rise to constant local irritation.

DISCUSSION ON LARYNGEAL TUBERCULOSIS

My few remarks will refer to the lymph connection of the larynx with the rest of the body.

The lymph system of the body has been studied mainly by Sappey in his famous atlas, by P. Poirier and B. Cunéo in Poirier et A. Charpy, *Traité d'Anatomie humaine*, 1902, and by August Most, *Zeitschr. f. d. Chir.*, 1900, and his "Topographie des Lymphgefäß-Apparates des Kopfes und des Halses," 1906.

The lymph vessels of the larynx are most copious where the mucous membrane is thickest and most succulent, viz., in the region above the vocal cords; very much less numerous below the vocal cords where the mucous membrane is very thin. Here the lymphatics are scarce and so narrow that their injection is attended with great difficulty, and mostly fails. Anastomosis of this portion of the lymph vessels with the neighboring organs,—viz., tongue, pharynx, and trachea, is defective. The upper part of the larynx is connected with the lymph bodies located along the jugular vein. Its sub-glottic part has no, or few, such connections. Indeed, the small glands found on the level of the thyrohyoid membrane receive no lymph vessels from the larynx at all, but from the pharynx, the epiglottis, and the artenoid part of the larynx.

The lymph vessels of the trachea resemble very much those of the lower half of the larynx. There are four lymph outlets from the larynx, two lateral ones from the upper, one anterior and one posterior from the lower part of the larynx. These latter are very thin and few in number.

All these lymph connections are of vast importance to the surgeon dealing with carcinoma of the larynx. As long as the tumor is lateral, it affects the glands of the same side. Thus the location of the metastatic glandular

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tumor shows, as a rule, the diagnosis of the location of the tumor. Bilateral metastatic tumors indicate the bilateral seat of the cancer.

Tuberculosis of the larynx does not affect the neighboring glands to the same extent. Even the deep cervical glands are more frequently infected from the pharynx than from the larynx. Peritracheal glands are rarely tuberculous; the prelaryngeal glands swell in a few cases only. "When they were found, however, even of small size, bacilli could be demonstrated" (Most, p. 125). But they are not often found. This agrees perfectly with other clinical observations. We have known this third of a century that, for instance, in cases of diphtheritic croup, when the membrane is confined to the larynx exclusively, necessitating tracheotomy or intubation, the system does not participate in the process at all. In these cases there are no, or very few, constitutional disturbances. That is shown by the absence of fever, and the absence of swelling of the lymph bodies of the neighborhood. In so-called pseudo-membranous croup which does not extend beyond the larynx, this observation is even more positive than the relation of diphtheria of the tonsils, which as long as they are the only seat of a diphtheric exudation, give rise to no, or very little, glandular swelling.

These anatomical remarks concern all cases of laryngeal tuberculosis, both secondary and primary. The latter, though rare, may occur at all periods of life, even in the nursling. The few cases occurring in the latter were complicated with extensive tuberculosis of the bronchial glands. The explanation of this complication is furnished by the changes which take place in the anatomy of the several periods of life. In all mucous membranes the lymph vessels decrease in size and number with advancing years,—in the intestine, in the pharynx, principally in the tonsils, and mainly in the larynx. The prevailing diphtheria of this half century and universal observation proves that. Anatomists have learned that the injection of lymph vessels in the newly-born is easy; begins to be difficult in children a few years old, and is very difficult or impossible in many

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localities of the adult body. That is why the bronchial glands are easily affected by the primary tuberculosis of the larynx in the newborn, and why with increasing years the same local disease may not, or very little, spread to the lymph circulation of the body at large, and may remain localized. Indeed, this relative absence of general tuberculosis in laryngeal phthisis is often observed.

A very few practical remarks you will permit me. I have very little experience with the local treatment of the tuberculous larynx, but see a great deal of pharyngeal tuberculosis in its complication with the tuberculosis of the larynx. You are all acquainted with the fierce suffering of dysphagia in such cases. Gargles do no good. They never reach the posterior wall of the pharynx, for there are very few who will ever learn how to reach it and expel the fluid through the nares. I like to spray the throat, either directly or through the nares, once or twice a week with a one or two per cent. solution of nitrate of silver. The excessive pain caused by swallowing you may relieve or remove by the use of small doses of morphia a few minutes before each meal. A hypodermic tablet of $\frac{1}{8}$ th grain, more or less, is placed on the tongue and sucked down without water. Its absorption is local and requires but a few minutes. Very little more time than that of the same amount of morphine when used subcutaneously for other purposes. Four or five drops of Magendie's solution, not diluted, applied in the same way, has the same effect.

Finally, I have always protested against leaving any tuberculosis,—mainly, however, pulmonary tuberculosis,—alone, with fresh air, good food, sanitarium treatment, and all that. For seventeen years I have treated tuberculosis with guaiacol, or, better still, when the patient is not too poor to pay for it,—a guaiacol salt, preferably the carbonate. Good creosote contains only 60 per cent. of guaiacol. I know it works well. If I had any voice in the matter, no sanitarium patient would be treated without a preparation of guaiacol, year in, year out. I am certain I have given it in these seventeen years to 5,000 patients. I shall do the same, unless I find something

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better, in the next seventeen. We are frequently, indeed, in a position to utilize the evidence of clinical experience, and to learn the reason and the theory afterward. Maybe guaiacol acts as an intestinal anti-fermentative only; maybe, as I believe, it has a positive antidotic action on the circulating toxin of the bacillus.

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